DOMESTIC ENGINEERING

Whole Number 138 *Chicago and New York, April Fifteenth, Nineteen Hundred and One* *Vol. 21, No. 1*

NEW YORK, BOSTON, MINNEAPOLIS, DENVER, PHILADELPHIA, ST. LOUIS, LONDON, HAMBURG **AMERICAN RADIATOR CO.** GENERAL OFFICES LAKE & DEARBORN STS CHICAGO.

DON'T SWEAR
USE OUR INCANDESCENT MANTELS IN 1901
Harding Incandescent Co.
HARDING BLDG.
CHICAGO.

PATTERNS
GOBEILLE PATTERN CO. Cleveland, O.

BUFFALO FAN SYSTEM

OF HEATING VENTILATING AND DRYING

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

The Pattern Shop of the East
H. B. OLMSTEAD & CO.
87 FRANKFORT ST NEW YORK

F. E. Cudell's PATENT sewer gas and back-water trap

for wash bowls, sinks, bath and wash tubs

Put into the White House by the U. S. government. For venting use vent trap.

CLEVELAND, OHIO

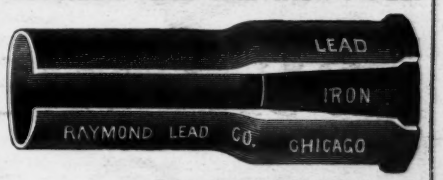
Mantle Chemicals
The Roessler & Hasslacher Chemical Co.
Office: 100 William St., New York.
Chicago Office: 16 N. Clark Street.

WATER SUPPLY BIG VOLUME LIFTS
L. E. RHODES CO.
HARTFORD, CT.

See our Advertisement...Page 21

WHAT A DIFFERENCE
In the quality of Plumbing work.
RAYMOND'S

COMBINATION FERRULES MAKE RELIABLE CONNECTIONS BETWEEN LEAD AND IRON PIPES.



WHY?

Because they have an extra thickness of lead over the shoulder, giving strength where it is needed, and where other Lead Ferrules are weak.

The genuine article bears our label.

RAYMOND LEAD COMPANY, CHICAGO.

SEE ADV. ON PAGE IV
Paragon Boiler
ISAAC A. SHEPPARD & CO., - PHILADELPHIA

MICA INSULATING JOINTS
GAS, ELECTRIC AND COMBINATION FIXTURES
J. L. OEFINGER MFG. CO.
14 N. CANAL ST. CHICAGO, ILL

'96 JENKINS' '96 SHEET PACKING
Pronounced by steam users throughout the world the best joint packing manufactured. Expensive? Not at all, as it weighs 30 per cent. less than many other packings, consequently is much cheaper.
JENKINS BROS., N. Y., Boston, Phila., Chicago.

Constructed under the Jewell Warren Continental & Hyatt Patents
GRAVITY AND PRESSURE FILTERS
WRITE FOR CATALOGUE
New York Continental Jewell Filtration Company
40-42 W. Quincy St., CHICAGO. 15 Broad St., NEW YORK.

EACH MAN TO HIS TRADE.
Ours is the use of reflecting surfaces in artificial lighting. We have been at it nearly half a century, and our experience may be of use to you. State your requirements and we can supply them.
I. P. FRINK, 551 Pearl St., N. Y. City

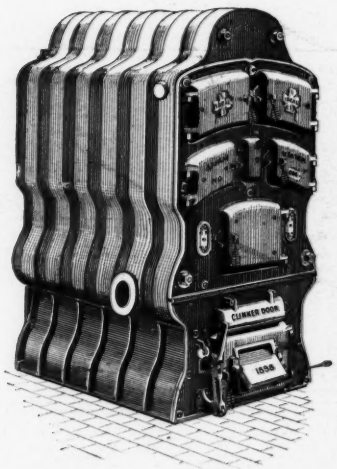
FOR SALE: SIMPLEX LEAD BURNING MACHINES
RICHARD A. LE GARDE
217 TRANSIT ST. PROVIDENCE, R. I.

"Things small, but significant, soon become important."

TD 1*
D66
v.21

We feel that the many little important improvements made in

our 1901 line



of Ideal Boilers will strengthen and continue the high regard in which they are held by those who appreciate the fine points in boiler construction. May we furnish you our latest descriptive catalogue and prices?

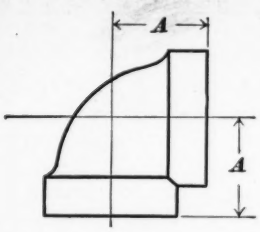
AMERICAN RADIATOR COMPANY

Lake and Dearborn Streets

NEW YORK
BUFFALO
MINNEAPOLIS

CHICAGO

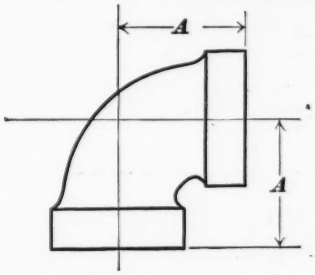
PHILADELPHIA
ST. LOUIS
DENVER



CRANE DRAINAGE FITTINGS

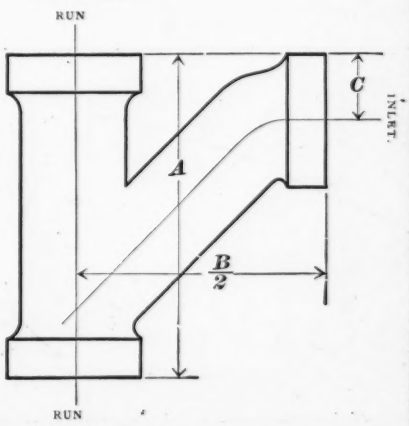
FOR THE WROUGHT PIPE SYSTEM OF DRAINAGE

THESE FITTINGS ARE MADE WITH AN INSIDE SHOULDER. THE PIPE SCREWS IN UP TO THE SHOULDER, MAKING A PERFECTLY FLUSH JOINT, THUS LEAVING NO POCKETS FOR SOLID MATTER TO LODGE IN AND CHOKE UP THE PIPE.



GALVANIZED AND MALLEABLE IRON DRAINAGE FITTINGS MADE TO ORDER

CAST IRON.

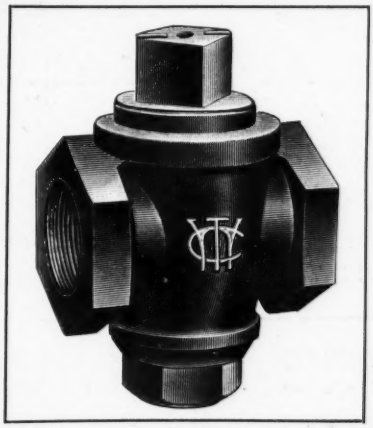


SEND FOR SPECIAL DRAINAGE FITTING CIRCULAR AND ILLUSTRATED AND DESCRIPTIVE CATALOGUE.

NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY
SIOUX CITY
OMAHA

CRANE CO.
CHICAGO
ESTABLISHED 1855

ST. PAUL
ST. LOUIS
LOS ANGELES
SAN FRANCISCO
PORTLAND, ORE.



Iron Cocks

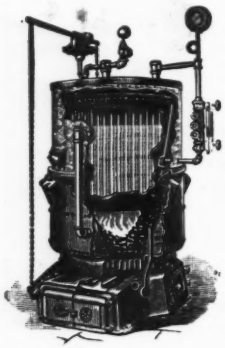
Improved Design, combining added strength, larger plug with opening full area of pipe, wide bearing to withstand heavy pressures.

Western Tube Company

Factory and General Offices: KEWANEE, ILL.

Branch Offices: CHICAGO, ST. LOUIS, NEW YORK, MINNEAPOLIS, SAN FRANCISCO

103865



Hard Coal Boiler.

The Gorton Side Feed Boilers

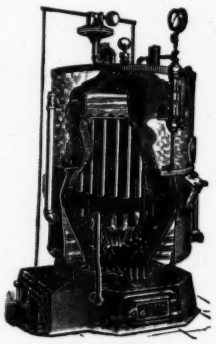
You want the best, We have it.

FOR STEAM AND HOT WATER HEATING.

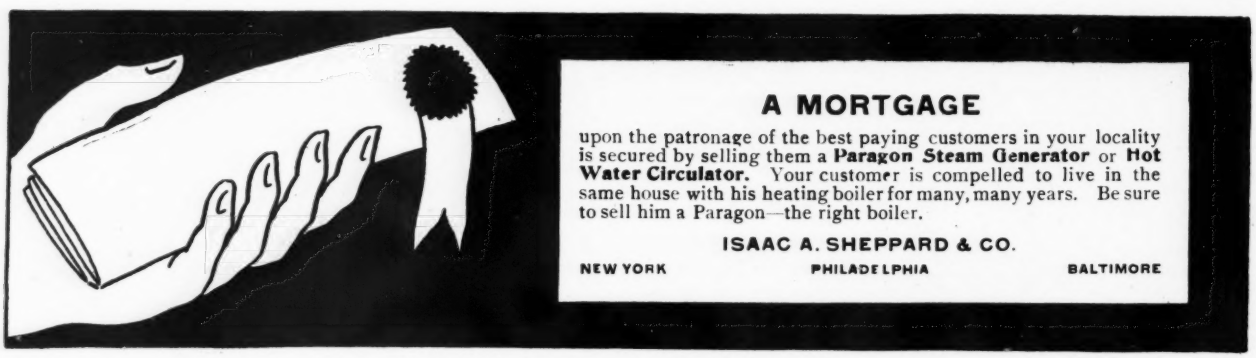
Send for Catalogue and Investigate for Yourself.

96 Liberty Street, New York.
77 Oliver Street, Boston, Mass.
Old Colony Bldg. Chicago.
Prudential Bldg. Atlanta, Ga.

GORTON & LIDGERWOOD CO.



Soft Coal Boiler.



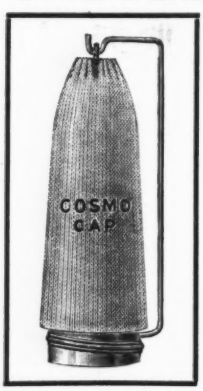
A MORTGAGE

upon the patronage of the best paying customers in your locality is secured by selling them a **Paragon Steam Generator** or **Hot Water Circulator.** Your customer is compelled to live in the same house with his heating boiler for many, many years. Be sure to sell him a Paragon—the right boiler.

ISAAC A. SHEPPARD & CO.

NEW YORK PHILADELPHIA BALTIMORE

TROUBLE WITH YOUR LIGHTS? NOT IF YOU USE



Cosmo Cap Mantle

Needs No Adjusting. Fits Any Incandescent Burner.

For Sale at all dealers **PRICE, 25 CENTS** Made by the

Cosmopolitan Incandescent Gas Light Co.

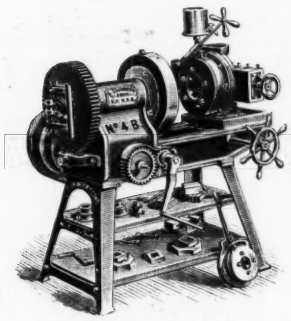
170 EAST MADISON STREET, CHICAGO

THE B. B. HIGH-PRESSURE BALL COCK

THE SIMPLEST AND BEST COCK EVER MADE.

No special packing required. Ground joint coupling which is always tight. Roller bearing lever on cam, reducing friction to lowest amount. No hammering, no singing or whistling. Has only one packing which is easily removed. Removable seat of best steam metal. We are making Floats stamped with our B. B. which are thoroughly guaranteed. Ask your jobbers for them.

Boston Brass Co., 36 & 40 Oliver St., Boston, Mass.



No. 4 B. Pipe Cutting and Threading Machine, ⅛-inch to 4 inches. Hand or Power.

D. SAUNDERS' SONS

YONKERS, NEW YORK

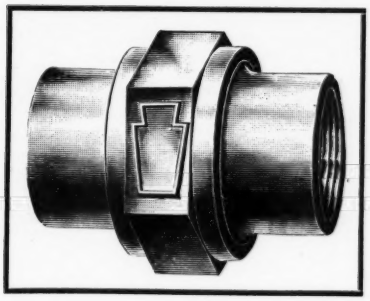
Manufacturers of Patent

Stocks and Dies

Threading Pipe ⅛-in. to 6-in. The larger sizes have **Cutting Off** attachment. These tools are light, strong and of superior design and finish. Also Pipe Threading Machines, ¼-in. to 18-in., hand or power.

Send for Catalogue to 35 Atherton Street, YONKERS, N. Y.

KEYSTONE UNIONS

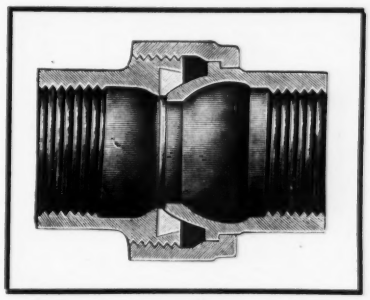


Malleable Iron,
WITH
SOFT METAL SEAT
Are Always Tight.

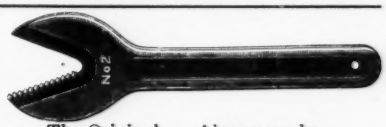
MANUFACTURED BY

Stanley G. Flagg & Co.

NEW YORK PHILADELPHIA

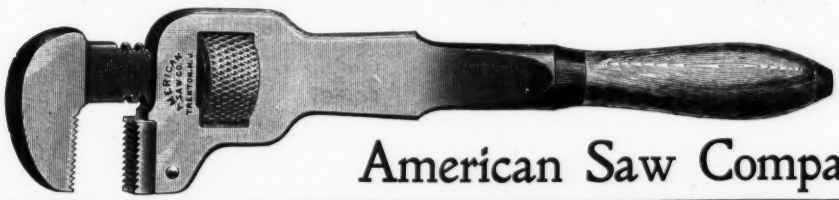


The Two Great Wrenches



THE "TRIUMPH" and THE "ALLIGATOR"

The Original. Always ready.
The Reliable. Always positive.
The Genuine. Never slips.

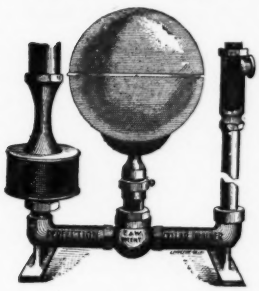


Never loses its grip or its handle.
Never crushes or locks on the pipe.
Can be used as a monkey-wrench or pipe-wrench.
Write for circulars and prices and mention DOMESTIC ENGINEERING

American Saw Company, Trenton, N. J.

We Want You

When in the market for



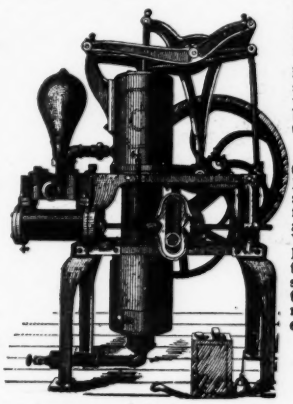
Hot Air Pumping Engines

Hydraulic Pumps

or

Cellar Drainers

to let us tell you about our devices and quote prices



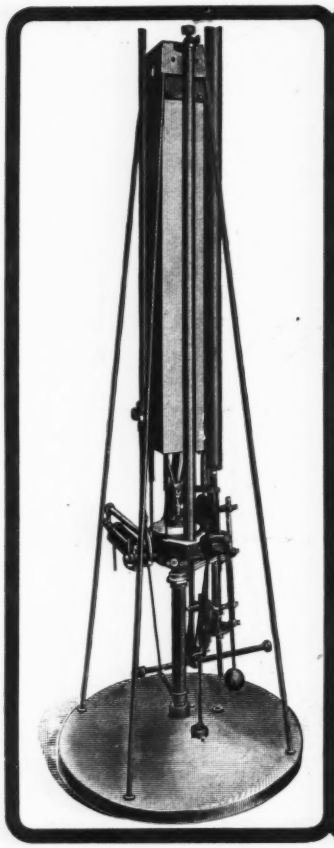
Erwin-Welch Hot Air Pumping Engine, Operated by use of gas, coal, gasoline or kerosene oil. Used to pump water from city mains to roof tanks or for pumping water from wells, cisterns, lakes and rivers for domestic or irrigation purposes.

Erwin-Welch Automatic Hydraulic Pump, Operated by Water Pressure Only. Used to increase city water pressure, or for pumping water from wells or cisterns for domestic use. These pumps can be used without wasting water and are automatic in their operation. Built in 25 sizes.

Our Perfection Cellar Drainer Is operated by water or steam pressure. Used to force out water that may accumulate in Cellars, Wheel Pits, Foundation, Ditch and Pit Excavations, etc. The Drainer stops and starts automatically. Is the strongest, most durable and most efficient made.

Descriptive Circulars Sent Upon Request

ERWIN & WELCH, Manufacturers, 35 and 37 S. Canal Street, CHICAGO



"The light so bright that birds will sing and say it is not night."

Agents Wanted

To Handle the

U.L. Generator

Generating from 1 to 50 lights of 100 candle power. Lights may be turned on or off in any room on any floor like gas jets. Automatic, self regulating generator.

Price, $125.00

Liberal Discounts to Agents. **For Terms and Territory address**

Universal Light Co.

26-28 North Canal Street **Chicago, Illinois**

Simple and Safe

No Competitors

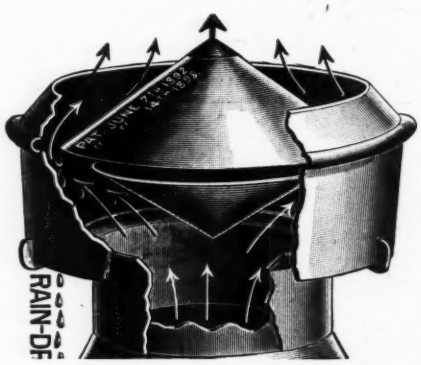
A Big Money Maker

Gasoline Tank may be placed 100 feet from Generator

"Pancoast" Ventilators

GREATEST EFFICIENCY AND LOWEST PRICES ARE OUR GREAT STRONG POINTS.

We have had the "PANCOAST" VENTILATORS in competition with other makes—in factories at the Cornell University and in thousands of cases of actual use—and the results have always been the same.



Sizes 2 in. to 10 ft.

THE "PANCOAST" WAS FOUND SUPERIOR TO ALL OTHERS, WITH PRICES ENTIRELY SATISFACTORY.

Write for model and catalogue.

National Pancoast Ventilator Company

Main Office: 223 & 225 S. 5th St., Philadelphia. Branch Offices: New York, Boston and Chicago.

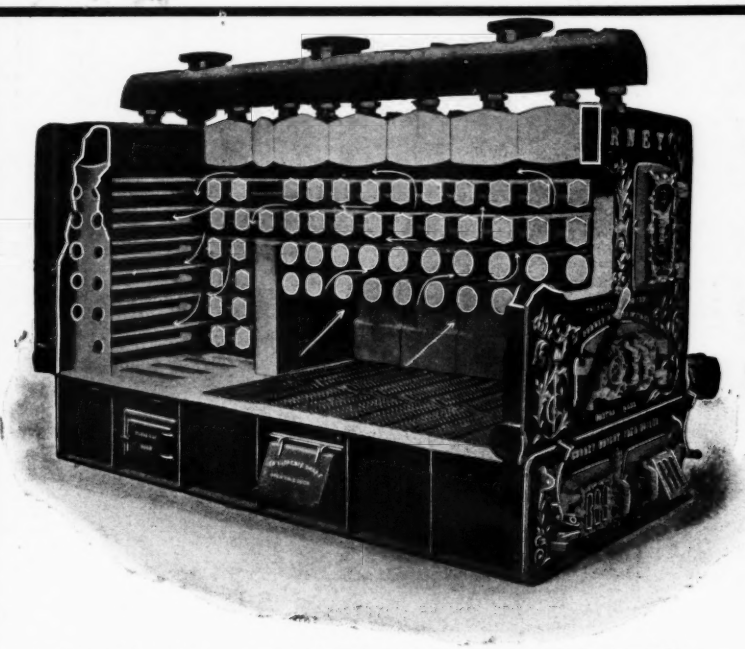


Illustration of "1200 Series" Bright Idea Sectional Safety Water Tube Heaters and Boilers. Capacities: water, 5,000 to 11,500 square feet; steam, 3,000 to 7,000 square ft. direct radiation. Also "600" and "700" Series Bright Idea Heaters and Boilers. Capacities: water, 1,500 to 6,425 square feet; steam, 900 to 3,900 square feet direct radiation.

Look at the picture—can you imagine a more powerful heating surface?

GURNEY HEATER MFG. COMPANY

BOSTON: 74 Franklin Street
NEW YORK: 111 Fifth Avenue
CHICAGO: Jas. B. Clow & Sons, 222-224 Lake Street.

Henderson Heaters

HAVE A SPECIAL DEVICE FOR

Burning the Gases

which commonly go unburned to the chimney. Without this device these heaters are equal to any made.

WITH IT THEY STAND ALONE.

The Prizer-Painter Stove and Heater Co.

READING, PA.

34 NORTH CANAL STREET CHICAGO

284 AND 286 PEARL STREET NEW YORK

PATENTED Dec. 9, 1890.
Feb. 2, 1892. June 14, 1892.
Other patents pending.

VACUUM VALVE No. 7

PERFECTED=DUPLEX

Steam Air Valve will automatically vent the radiator of the air, close by

FLOTATION AGAINST WATER and by **EXPANSION AGAINST STEAM**

After the air has been expelled from the radiator the **vacuum feature,** in the **top part of the valve,** is brought into service by the **phosphor bronze ball seating itself** so as not to permit any air to enter into the radiator through the valve, thus causing a vacuum, thereby necessarily **reducing consumption of fuel,** and with the valuable feature of locked shield which prevents tampering, must appeal to every user.

The **radiation surface** is **entirely heated,** which a steam heating **contractor will appreciate,** where contracts stipulate degree of temperature required.

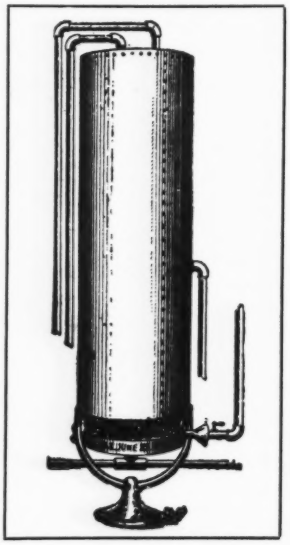
PRICE, $2.00 EACH

Manufactured by *Monash-Younker Co.*

203 S. CANAL STREET CHICAGO

43 CENTRE STREET NEW YORK

THE A. HELLER HEATER

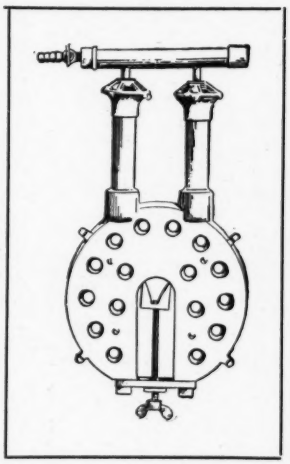


A GAS WATER HEATER

Is just the thing your Customer wants. It's the most Economical and Common Sense Heater ever put on the Market. It will supply the Kitchen and Bathroom with hot water. This heater is attached to the kitchen boiler and takes the place of the kitchen range as far as water heating is concerned, allowing the hot fire in the range to be dispensed with during the summer months. If a gas stove is used when cooking this heater will furnish hot water when wanted.....

PERFECT COMBUSTION NO ODOR
NO DIRT NO SMOKE

Heats in less time, and for less cost than any gas or coal stove in the market.....



SOLD TO THE PLUMBING TRADE ONLY---WRITE FOR CIRCULARS AND PRICES

J. P. B. SADTLER & CO., 813 SOUTH HOWARD STREET, **BALTIMORE, MD.**

WALLACE L. PIERCE, PRESIDENT
GEO. B. LITTLE, VICE-PRESIDENT

OSBORN B. HALL
GEN'L MANAGER MECHANICAL DEPT.

GEO. T. COPPINS, SECRETARY
GEO. H. GRAVES, TREASURER

Walworth Manufacturing Co.

TOOLS AND SUPPLIES

FOR STEAM, WATER AND GAS USERS

ESTABLISHED
1842

INCORPORATED
1872

128 TO 136 FEDERAL STREET
BOSTON, MASS., U. S. A.

NEW YORK OFFICE, PARK ROW BLDG.
FACTORY, SOUTH BOSTON

THE AMERIGAN PROGESS ENGRAVING GOMPANY

MAKERS
OF
FINE
CATALOGUE
ILLUSTRATIONS

15 to 17 WEST SIXTH STREET, GINGINNATI, OHIO, U. S. A.

GEM Hot Water and Steam BOILERS

EASILY AND QUICKLY SET UP
CAPACITY GUARANTEED

WE ALSO MAKE THE

ABENDROTH VERTICAL SECTIONAL STEAM AND WATER BOILERS

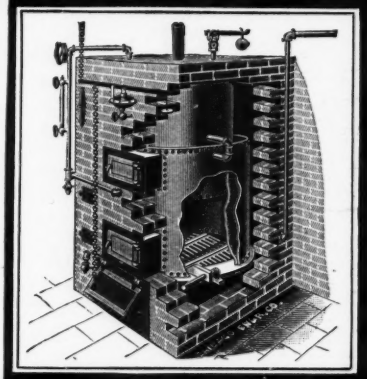
LONG AND FAVORABLY KNOWN TO THE TRADE EVERYWHERE

Write for Illustrated Catalogue

ABENDROTH BROS. 109-111 Beekman St., New York
114 High St., Boston, Mass.
Pt. Chester, W. Chester Co., N.Y.

AGENTS: Crane Co., Philadelphia, Pa. Western Valve Co., Chicago, Ill.

KEWANEE BOILER COMPANY
KEWANEE ILL.



MANUFACTURERS OF
HAXTUN STEEL BOILERS FOR HOT WATER AND STEAM HEATING

"TABASCO" WATER HEATERS
ALL STEEL SELF FEEDERS

SEND FOR SPECIAL CATALOGUES
169 LAKE ST.
·CHICAGO·

STANDS ALL TESTS

IN ORDER TO OBTAIN THE BEST RESULTS IN RADIATION IT IS NECESSARY TO USE

The Argon Automatic Air Valve

It is the only one on the market equally efficient on both Steam and Hot Water Radiators.

TESTED FOR AIR
TESTED FOR GAS
TESTED FOR STEAM
TESTED FOR WATER
TESTED FOR SERVICE
TESTED FOR PERFECTION
AND NOT FOUND WANTING
EVERY ORDER BRINGS
ITS DUPLICATE

Steam Heaters, Contractors and Fitters are not acquainted with the best Valve on the market, unless they have tried the ARGON.

The decision of experts, evinced not only in opinion, but as the result of experience, is that the

ARGON VALVES DO THE WORK
ARGON VALVES ARE RELIABLE

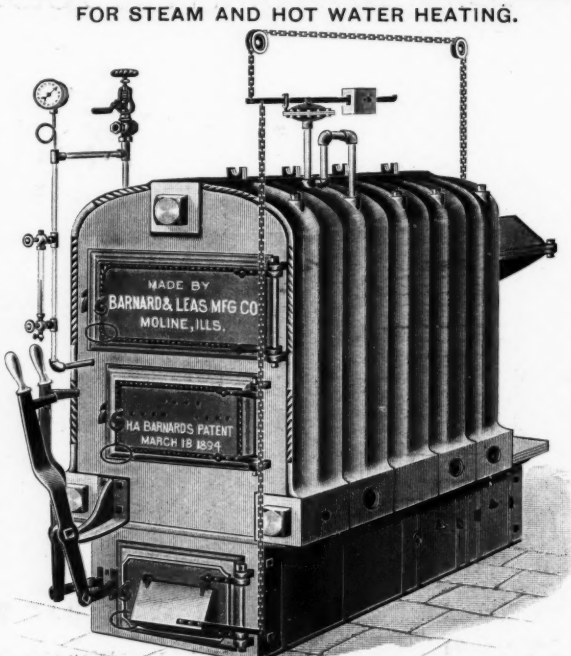
Need No Adjustment Are Guaranteed

INTERIOR VIEW. EXTERIOR VIEW

WRITE FOR SAMPLE

The Argon Manufacturing Company
DENVER, COLORADO.

THE BARNARD BOILER
FOR STEAM AND HOT WATER HEATING.

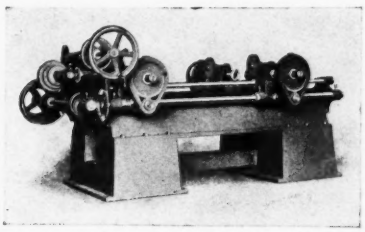


Adapted to all kinds of fuel. Is economical, durable and efficient. Is simple and easy to operate. SEND FOR OUR NEW CATALOGUE.

BARNARD & LEAS MFG. COMPANY
MOLINE, ILLINOIS.

This 4 Spindle Heater Drill

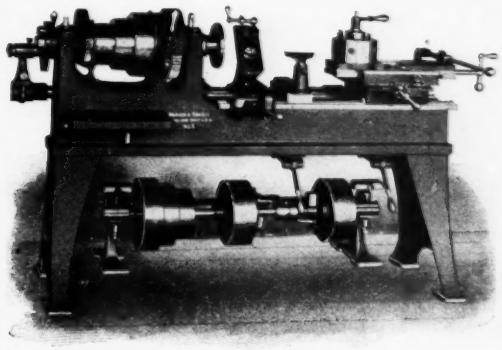
is designed for boring, facing and tapping radiator, heater and boiler sections.
Spindles have both hand and power feed, quick advance



and return and automatic stop, and will bore and face four 5 inch holes at once.
We build also a six spindle machine for making three-part sections. See new catalog for description of 4 spindle radiator drill.

The Bickford Drill & Tool Co.
CINCINNATI, OHIO, U. S. A.

A COMPLETE LINE OF
Screw Machines and Turret Lathes
BRASS WORKING MACHINERY



UNIVERSAL TURRET LATHE
With Geared Friction Head, Compound Turret and Chasing Attachment

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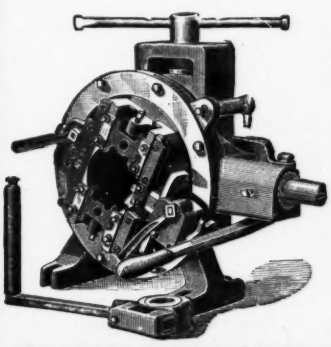
WARNER & SWASEY
CLEVELAND, OHIO

MINUTES COUNT

When you have a "Rush" Job on hand 'tis then the virtues of
ARMSTRONG'S
WATER, STEAM AND GAS FITTERS TOOLS
make themselves apparent.



They are made especially for Time and Labor—Saving and for Extensive Wear.

PIPE THREADING and CUTTING OFF MACHINES
HAND or POWER
capacity from 1-4 in. to 6 in.
PIPE WRENCHES
VISES
ADJUSTABLE STOCKS and DIES
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THE ARMSTRONG MFG CO
BRIDGEPORT, CONN., U.S.A.
NEW YORK 139 CENTRE ST.
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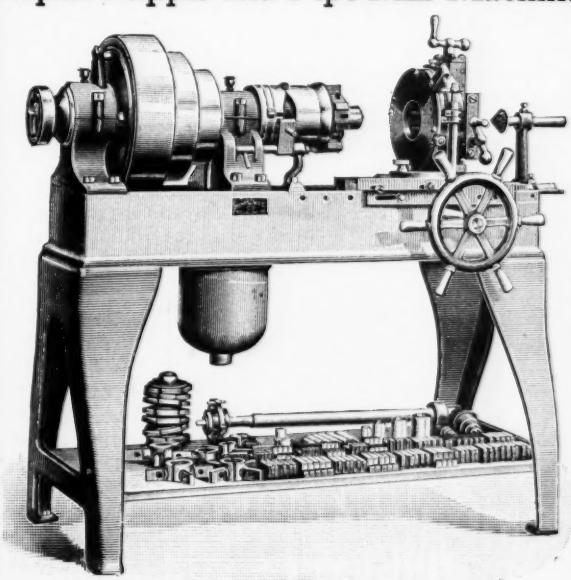
Apex Nipple and Pipe Mill Machine



Will thread nipples thread to thread all sizes within range of machine.
Equipped with our Standard Adjustable Quick Opening and Closing Dies, allowing cutting off of pipe close to grippers.
Nipple grips can be closed on threaded end of pipe without injuring thread.
Only machine on the market with this feature.
Write for catalogue and prices.

MERRILL MANUFACTURING COMPANY
208 Curtis Street, Toledo, O., U. S. A.

This is Not an Acetylene Gas Machine

Ransom Automatic GAS— Machine

Produces by a new process a clean, odorless gas for lighting, heating, cooking, power, etc., at a cost less than any other process.

For Houses, Churches, Halls, Etc., It Has No Equal.

Make your own gas and save 50 per cent of what it costs you now.

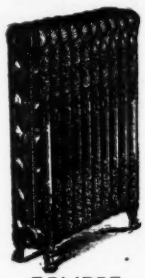
The cheapest and best artificial light in the world is produced by the Ransom Gas Machine. Absolutely safe, being approved by Board of Underwriters. A 60 candle power light will not cost to exceed one-quarter of a cent per hour. Fifty cents per week will furnish sufficient gas to do your cooking. The Ransom has no equal. Agents wanted.

Ransom Gas Machine Co.

374 E. Water Street MILWAUKEE, WIS.

BREMEN

Our goods and prices will interest you— permit us to demonstrate this.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Holland Radiator Co.

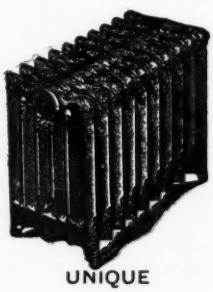
CHICAGO: 38 DEARBORN STREET
DENVER: 1759 STOUT STREET
WORKS: BREMEN, IND.

RELIANCE

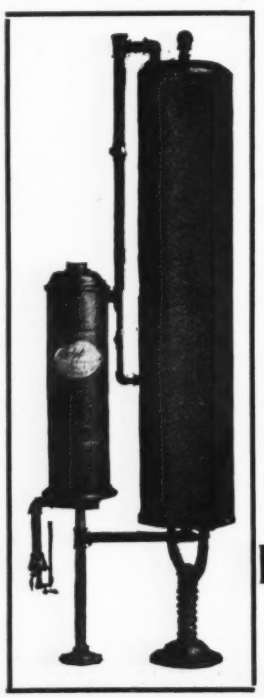
Agents:

United States Water and Steam Supply Company, Kansas City

The George Worthington Company, Cleveland


UNIQUE

ECLIPSE ROUND WATER HEATERS



We think:

Round Water Heaters are the best form. Take room which is useless for other purposes. Our Round Heaters better than those copied after ours, but not possessing our advantages.

Why low prices?

Built special machinery; must have volume to keep going; their sale stimulates gas range business.

Merits:

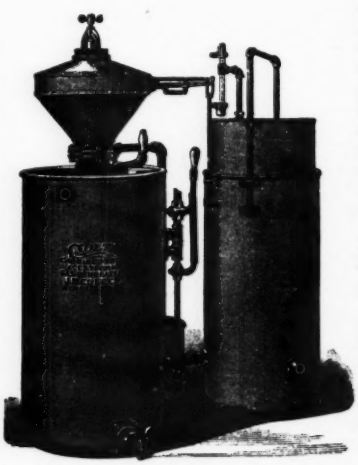
Our Heater, under severest tests, has from 35 to 50 per cent greater efficiency than others.

New Catalogue, just ready; mailed on request, mentioning Domestic Engineering

Eclipse Gas Stove Company

ROCKFORD, - ILLINOIS

COLT TRADE MARK. CARBIDE FEED ACETYLENE GAS GENERATORS



Indorsed by the United States Government. The Department of Agriculture of the State of Pennsylvania says: "Safer than the usual employment of petroleum."
Entirely new principles involved. Made of the best materials, by the most expert mechanics. Guaranteed by the largest and most experienced concern in the business.

The COLT TRADE MARK Generators, are lower in price, more economical, and more easily installed and operated than any other make, and occupy one-quarter of the space.
No waste of gas; no heating. This is not true of other makes.

J. B. COLT CO.

21 BARCLAY ST,
NEW YORK, N. Y.
421 Chestnut Street, Philadelphia, Pa.
146 Franklin St., Boston, Mass. 189 La Salle St., Chicago, Ill.

Our New Heater

The Acme No. 15

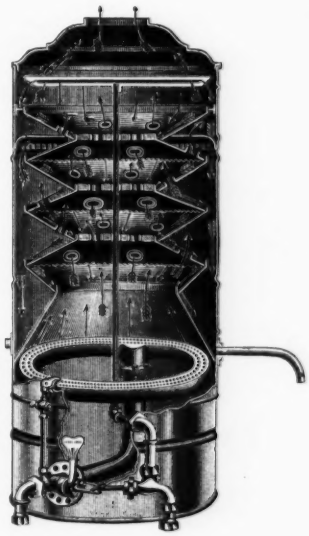
Will please your trade. It heats more water with a smaller Gas Consumption than any other Heater on the market.

It is 28 inches high
and 12 inches in diameter

List price, nickel plated,

$20

IT HAS A LARGER HEATING SURFACE CONSIDERING ITS SIZE, THAN ANY OTHER HEATER ON THE MARKET



There are other new features that will interest you. For information about them and discounts, address

THE MAKERS OF THE

Douglas, Acme and Flush Heaters

The Instantaneous Water Heating Co.

OHIO AND ORLEANS STREETS

CHICAGO

THE EAGLE

THE EAGLE NO. 3.

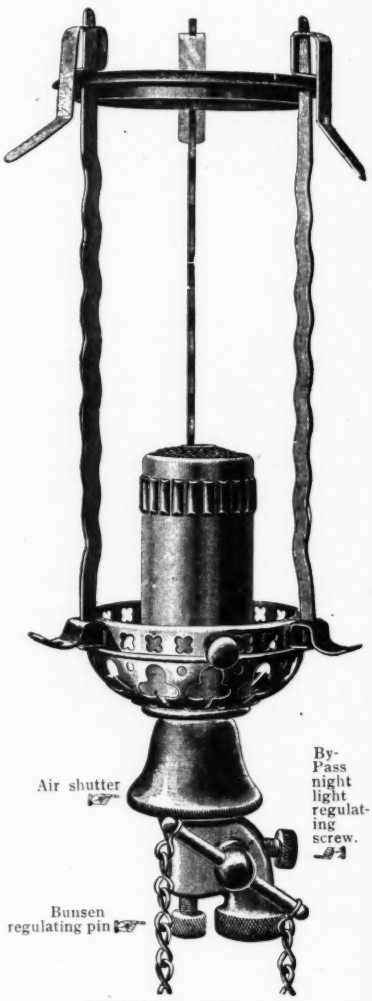
THE EAGLE NO. 5.

INSTANTANEOUS WATER HEATERS INCANDESCENT GAS BURNERS

Will prove themselves the favorites for 1901.

The Interlocking Valves with Safety Pilot Light, as fitted to all Eagle Heaters, insures safety in using. The only make Heater in the world wherein all parts are interchangeable.

A By-pass Burner for Incandescent Gas Lighting that readily adapts itself to the varying conditions. It is the kind that where one is tried others follow. Good light, non-clogging, easily adjusted, and the new feature of a night light, these are the virtues that are winging the Eagle to the top.



THE EAGLE NO. 47.

MANUFACTURED BY

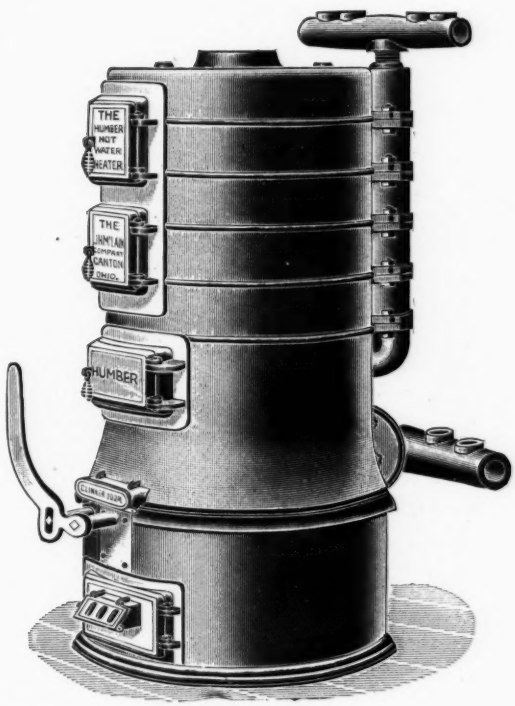
The S. Bernstein Co.

82-86 WEST BROADWAY, NEW YORK

The J. H. McLain Company

MANUFACTURERS OF

Hot Water and Steam Boilers



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Radiators Valves Pipe and Fittings

AND ALL MATERIAL USED IN THE CONSTRUCTION OF HOT WATER OR STEAM PLANTS

SEND FOR CATALOGUE

The J. H. McLain Co.

CANTON, OHIO

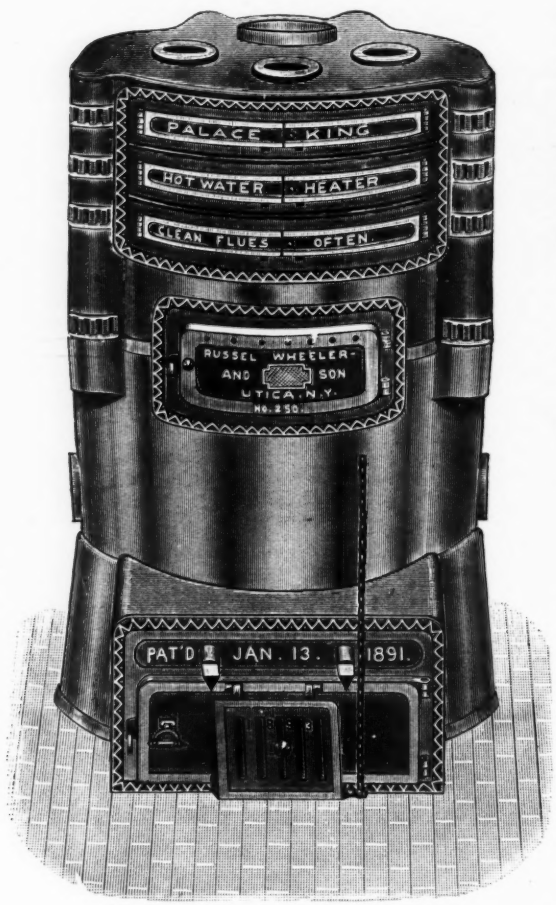
"The KING can do no wrong"—

By a strange co-incidence

THE PALACE KING
HOT WATER HEATER

is always in shape for satisfactory work.

The inclined water ways insure a rapid and un-impeded circulation.



What more is to be said? Doesn't the whole subject, after all, resolve itself into a question of **Circulation?**

The Palace King is built for business.

INTERNATIONAL HEATER COMPANY

LARGEST MAKERS OF HEATERS IN THE WORLD

BOSTON NEW YORK CHICAGO DENVER

March 1st, 1901, Price List shows some interesting changes—write us.

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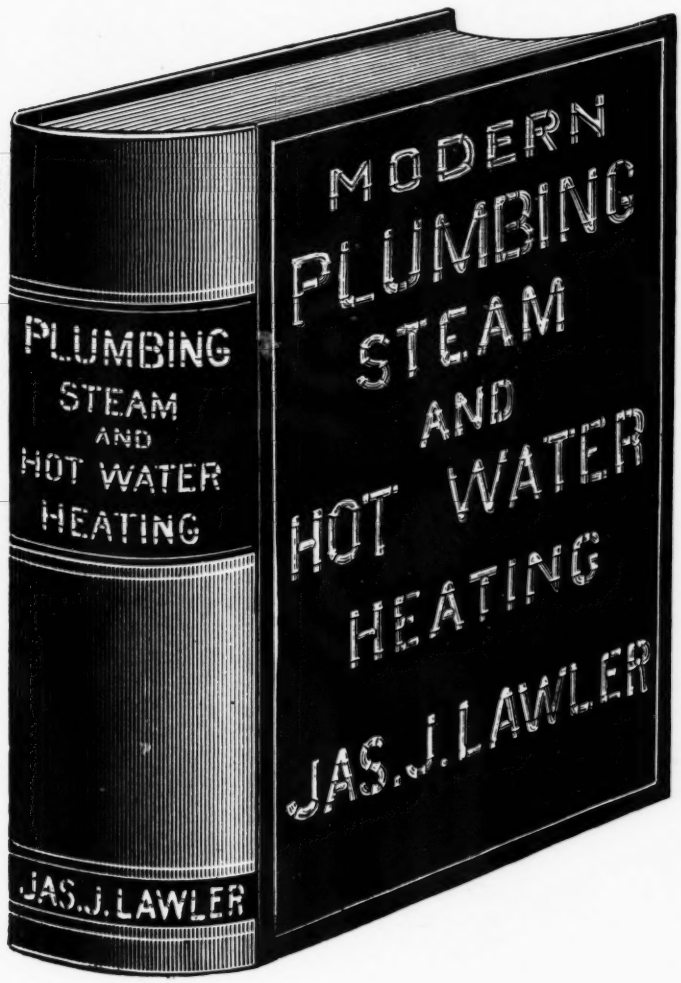

In Plumbing

It explains soil and waste pipe ventilation, back venting, the house trap, the fresh air inlet and their advantages. Siphonage of traps, the cause and how to remedy the same. How to test soil and waste pipes. Probable questions of plumbing examining boards, and answers to same. Hydraulics of plumbing, with original illustrations. Practical drawings and all important features in the construction of modern plumbing work.

In Heating

It tells how to correctly figure on any size or shape of building with steam or hot water. How to find the heating capacity of any shape or make of boiler for steam or hot water heating. The most practical timesaving tables ever compiled and published. A new table of how to quickly find the correct measurement of 45° angles, a most useful thing in steam and hot water construction. This has never before appeared in print.

More practical illustrations than ever published in any one volume, which shows the various systems of construction, in the heating and ventilating of buildings by the steam or hot water systems.

Over three hundred diagrams and illustrations, showing the various systems of construction in the heating and ventilating by steam or hot water systems. Six folding inserts showing waste pipe system of plumbing, one pipe system of both steam and hot water heating, overhead system, fan system of heating and ventilation, and steam and hot water circuits. 400 pages, large octavo size, 10x7½ inches. Bound in extra cloth.

Price, $5.00

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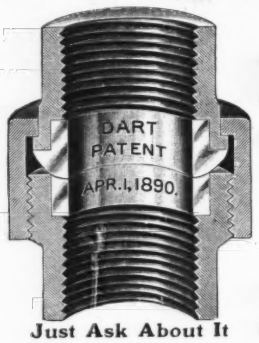
A Union forever



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Best in the World

Bronze Ball Seats
Ground Joint
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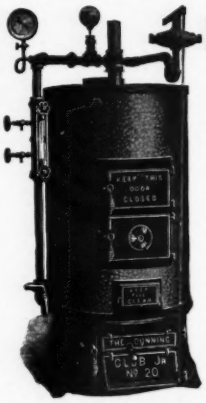
Manufactured by

E. M. DART MFG. CO.

Providence, Rhode Island

Just Ask About It



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THE OLD RELIABLE

A NEW TYPE FOR SMALL HOUSES.

THE CLUB JUNIOR

	STEAM	HOT WATER
No. 15	175 ft.	275 ft.
No. 20	200 ft.	325 ft.
No. 30	250 ft.	425 ft.
No. 40	300 ft.	525 ft.

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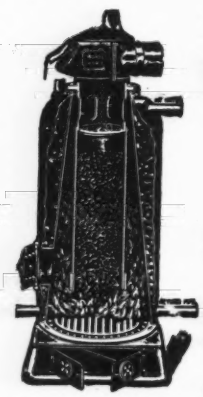
New York Central Iron Works Co.

GENEVA, N. Y., U.S.A.



N.S. BOUTON Pres. E.H. SEDGWICK Treas.,& Gen'l Mgr.

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HOT WATER HEATERS
AND STEAM GENERATORS

Best in Use ::::: All Steel ::::: No Coils "Flues"
No Cast Iron Sections :::::: Send for Catalogue

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NEW YORK OFFICE,
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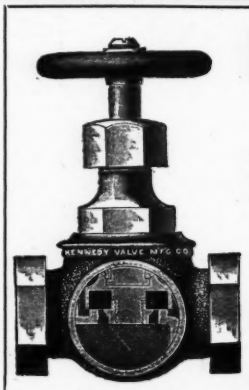

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WITH RENEWABLE DISCS

Never leak :: Always reliable

Are extra heavy, made of best steam metal. UNUSUALLY LARGE OPENING for passage of steam or fluid.

PERFECTLY TIGHT UNDER ALL PRESSURES OF STEAM, OIL OR GAS

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The Kennedy Valve Mnfg. Co.

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Works: Coxsackie, N.Y. NEW YORK

NOTHING but a QUICK OPENING VALVE will do some places

The Vincent

can be locked immediately. It also has the adjustable wedge. If your jobber does not keep them, write us.

Sweet & Doyle
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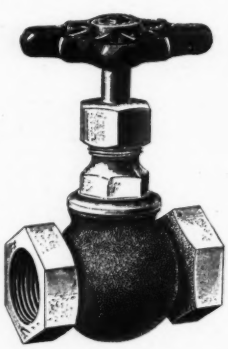


...USE...

K. & M. Valves

HIGH-GRADE WORKMANSHIP
PACKED STEMS
GENUINE STEAM METAL
THOROUGHLY TESTED

Sold from Standard Lists.

KINSEY & MAHLER CO., - PEORIA, ILL.

Billings Pipe Bender

Patented September 24, 1889
Invaluable to Plumbers—Saves Ten Times Its Cost Every Month. Send for Prices.

This device is a **Specially Shaped Spiral Spring** made from **Crucible Steel** wound tapering to one end so as to be easily withdrawn, and having a loop at the other to hook into when the bend is to be made in a long piece of pipe. The Bender placed inside of the pipe, supports and prevents the pipe from flattening or collapsing while being bent. By the use of it lead pipe, and copper, brass or steel seamless tubing may be quickly and easily bent. It is as easy to form opposite or double curves, such as goose necks, as a single bend.

We carry in stock ¾, 1, 1¼, 1½, 2, 2½ and 3 inch Benders.
Special sizes on demand.

The Billings Pipe Bender Mfg. Co.

38 Park Place and 33 Barclay Street NEW YORK CITY

One End Water Connection.

Saves extension of pipe to further end of hot water radiators. Makes better, cheaper and neater work. Get new catalog of this new thing.

American Plumbers Supply Co.

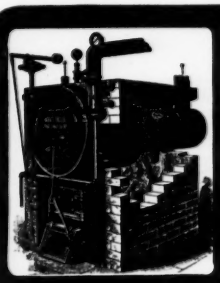
76-80 Pratt Street, Chicago.

Coming Heat of Twentieth Century

The Jas. A. Trane System of Vacuum Heating has all the advantages of Hot Water Heating with none of its objectionable features.
Will heat a building with from 25 to 50 per cent less fuel than a Hot Water System.
Is absolutely noiseless in operation.
In case of breakage not one drop of water will escape from the system.
Such a thing as an explosion is an utter impossibility.

The Jas. A. Trane Vacuum System of Heating.

201-203 South Fifth Street, La Crosse, Wis.



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FOR

Steam and Hot Water Heating

FOR SOFT OR HARD COAL

Durable and Economical. We claim to save 33 per cent in fuel, as compared with other boilers.

Vance Boiler Works, Geneva, N. Y.

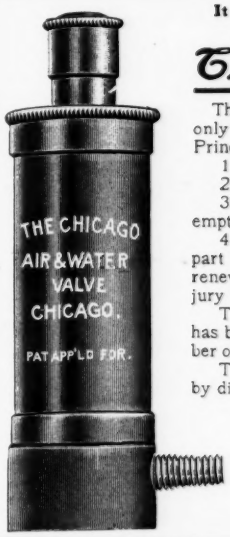
Write for Terms

The Niagara Falls Acetylene Generator

Like its patronym, **Powerful and Never Failing.** Costs less than any; attached to any house-piping; automatic in production. Really the best for agents.

Niagara Falls Acetylene Gas Machine Company.

NIAGARA FALLS, N. Y.



It is not only the name but the valve!

The "CHICAGO"

This Steam Radiator Air and Water Valve is the only valve that has the four correct Mechanical Principles of Perfection.

1. It will free radiators and coils from all air.
2. It absolutely prevents all water leakages.
3. The air chamber and separate partition empties valve from water and it will not water-log.
4. Durability of valve is assured, as expansion part is protected from injury and can be readily renewed at slight cost, while with other valves injury to expansion part destroys valve.

This valve is entirely automatic in action and has been severly tested, having been in use a number of years and giving perfect satisfaction.

The several features of this valve are protected by distinct patents. Other patents pending.

None Genuine Uuless the Name "CHICAGO" is Stamped thereon.

Chicago Air & Water Valve Co.
3133 South Canal Street
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CHAS. THACKARA, Pres. W. F. DUFFIELD, Treas. ELIAS HOGELAND, Secy.

ESTABLISHED 1842.

THACKARA M'F'G. COMPANY,

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FIXTURES,

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WIRE STRUNG TAGS A SPECIALTY

THE AMERICAN MFG COMPANY.
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MANUFACTURERS OF
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STRONGEST SHIPPING TAGS IN MARKET

High Grade Thorium

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J. MARSCHING & CO.

27 Park Place New York

Extra Brilliant Bronze Powders

IN GOLD, ALUMINUM AND ALL COLORS.

Send for samples and prices to

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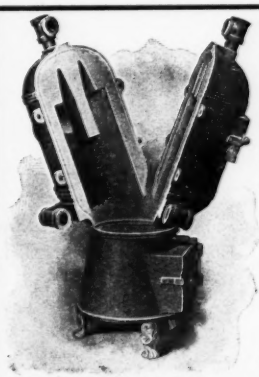


Bundy Daisy Tank Heater.

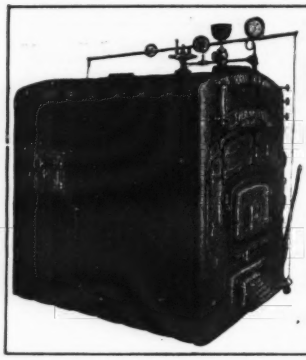
HOW'S THIS FOR A LETTER

"I have put in apartments Nos 414, 416 and 418 West 36th St., New York, three of your Bundy Daisy Tank Heaters No. 1417. One half each heater is heating a tank 30x72 inches supplying 12 families with hot water; the other is heating a tank 30x60 inches supplying 8 families. One half of heater and one tank is supplied from the street and the other half and other tank is subplied from roof tank. They are giving entire satisfaction.

J. J. Holloran.

Each half of the Bundy Tank Heater may be connected separately, in fact one may be used for heating a tank and the other for heating radiators.

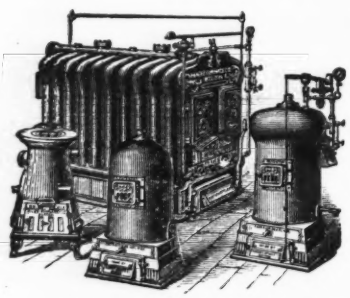
A. A. GRIFFING IRON CO.
66-68 Centre Street, New York
Boston Philadelphia Jersey City
Send for catalogue DE and bottom prices.



HAVE YOU SEEN
The **Furman**
New Model Boiler
For Steam or Hot Water (Interchangeable)

Sectional—Self Contained—Surface Burning—19 sizes—Capacities 350 to 4000 sq. ft.—Any size can readily be enlarged—Let us send you Free our new Catalogue and Fitter's Hand Book of valuable information for Practical Fitters. **Write for them to-day.**

The **Herendeen Mfg. Co.** Dept. D.
Geneva, New York
Branches: New York, Boston, Bloomington, Ill.
Philadelphia Office, Builders' Exchange



MAGEE STEAM AND HOT WATER **HEATERS**

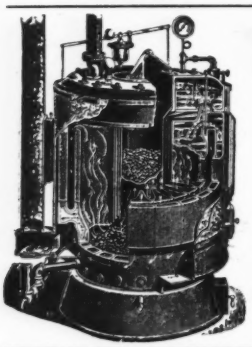
GOLD MEDAL PARIS EXPOSITION HIGHEST AWARD

THE MOST COMPLETE LINE UNDER ONE NAME MADE IN THE UNITED STATES

OUR CAPACITIES RANGE IN
Square feet of Water Radiation 100 to 6,000
Square feet of Steam Radiation 200 to 3,600

Send for catalogue Correspondence solicited

MAGEE FURNACE CO., BOSTON, MASS.



YOU KNOW

How coal is wasted up a flue. We guarantee the **"ROBERTS"** to be the most economical and easily managed boiler on the market. Will not such a boiler get you further orders?

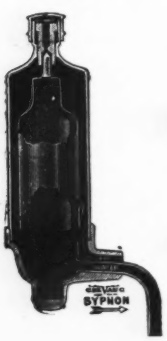
Philadelphia Office:
Builders' Exchange,
18 South 7th Street

Roberts Machine Company
Collegeville, Pa.

DIXON'S GRAPHITE COMPOUND

Is infinitely better than red or white lead for making steam, gas or water pipe joints. Joints will be tighter, and can be broken months or years after without damage to pipes or tools. **IT WILL PAY EVERY PIPEFITTER TO SEND FOR SAMPLE AND CIRCULAR.**

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.



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TRADE MARK
STEAM SPECIALTIES

PUMP GOVERNORS
PRESSURE REDUCING VALVES
BACK PRESSURE VALVES, ETC., ETC.

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The Clarence E. Van Auken Co.

NEW YORK, Howard and Centre Sts.
CHICAGO, 40 Dearborn Street

HADESTY IMPROVED TAPPING MACHINE

For tapping water and gas mains against pressure. It leads them all. Sold on approval. Taps mains from 3 to 30 inches. No saddles required for different sized mains. Weight, complete, only 18 lbs. A boy 12 years old can make a connection in 15 minutes. Get prices from

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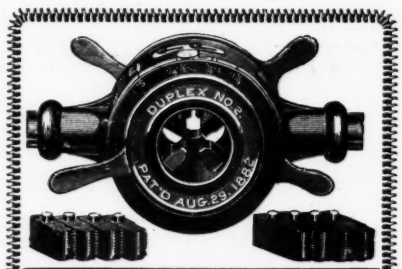

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DUPLEX ADJUSTABLE STOCKS and DIES should be in the hands of every PLUMBER AND PIPE FITTER. DO YOU OWN ONE? Let us mail you list and quote prices : : : : :

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"Do not advertise and stop,
But advertise and stay,
For those who read your ad last week,
Will look for it to-day."

The Climax Ratchet Stock

is an indispensable tool for conveniently threading iron pipe in ditches, under floors, in corners, overhead, etc. With this tool threads can be cut without removing whole lengths of pipe. This tool is provided with a strong vise which securely grips the pipe, and by means of the leading thread the die is forced on pipe and the thread is cut. It is made of malleable iron and steel, and, while light in weight, making it convenient to carry, is very strong and rigid. The advantages of this tool make it absolutely indispensable to Plumbers, Steam and Gas Pipe Fitters, Gas and Water Companies, Machinists, etc. It takes standard size dies, which are extra if furnished.

No. 1 threads ¼ to 1 inch pipe, takes die 2 and 2½ inches square.....$10.00
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For sale by leading jobbers.

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Adapted to buildings of any kind or size. Has all advantages of hot water heating without any objectionable features. Absolutely noiseless. No pressure. No air valves. No pumps or machinery. Superior to any other system of heating and costs less. Installed by all steamfitters. : : : : : : SEND FOR CATALOGUE.

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that it invariably "measures up" to the unique claims made for it,

The Webster System of Low Pressure Steam Heating

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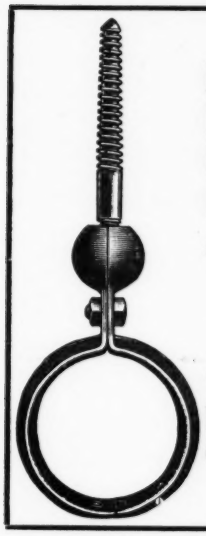

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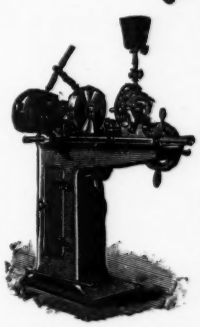

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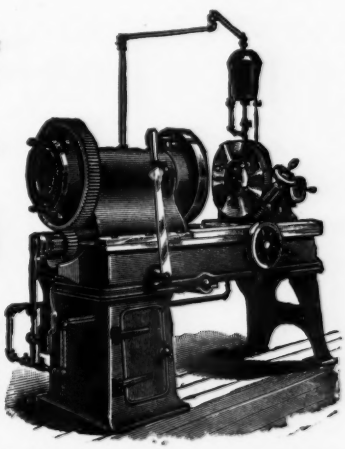

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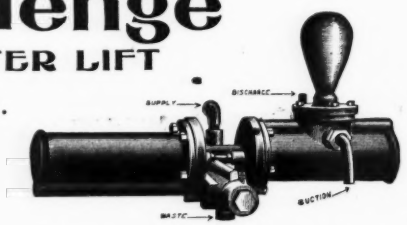

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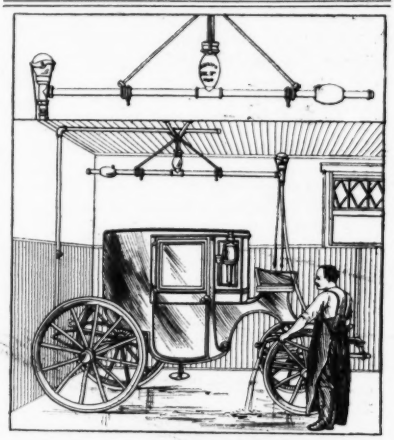

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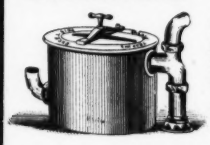

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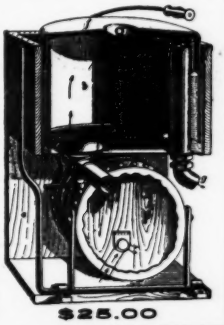
Has no glass gauges to break :: Cannot possibly force a good trap seal



$25.00

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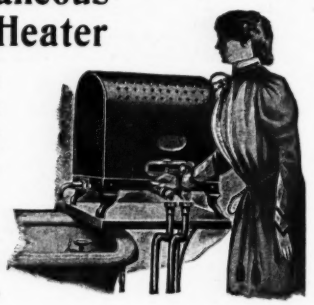

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W. J. ADAM....JOLIET, ILL.

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GAS WATER HEATER?

EFFICIENT, ECONOMICAL, COMPACT, MADE IN 3 SIZES.

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Circulars gladly sent on application.

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The Seiben Floor Drains

are the best that ever. They save digging a deep ditch. Calking of joints. Extra fittings. Hours time and grief. No stoppage of sewers. No evaporated trap seal. No back water and need no vent pipe. They are made with or without back water valve. Ask your jobber or write for our new catalogue.

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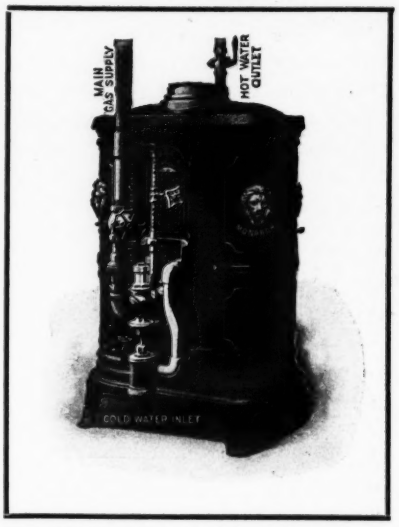

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OR HOW TO SOLDER WITHOUT SOLDER

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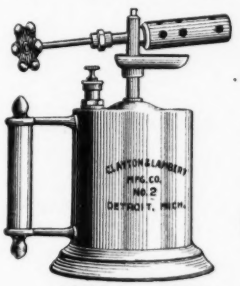

is fitted with our best round burner, and with brass **air pump**, making it **The Best Round Burner Torch** on the market. Sold by jobbers everywhere or we will ship by paid express upon receipt of $3.25. Catalog free. It's worth dollars to you.

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PRICE $2.50 NET.

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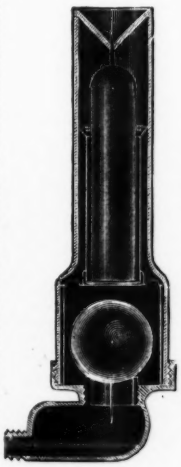

Is a positive seal against the return of air to the radiator through itself, and enchances the value of a low pressure steam heating plant fuly 50 per cent, while it materially reduces the coal bill.

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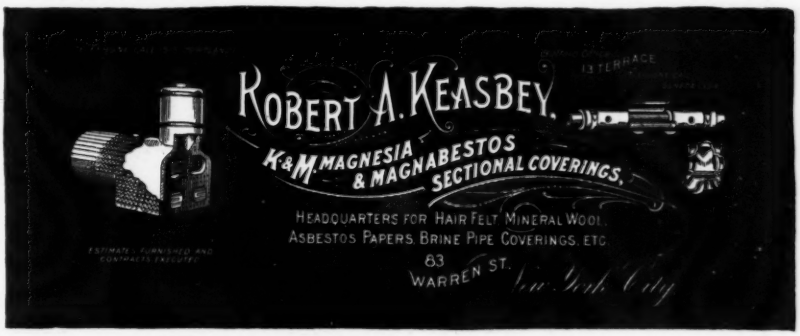
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will repair leaky boilers, piping, etc., it will withstand fire, water, steam and oil, it expands and contracts the same as iron. Write for catalogues and prices.

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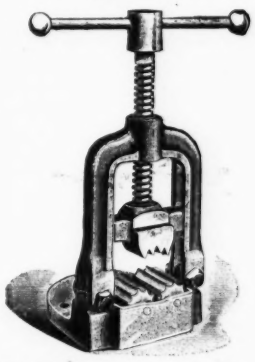

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SOLD TO THE TRADE FOR $1.25 NET.

Equipped with Roller Jaws which are a sure grip, will not mar the pipe and will outlast three or four sets of V Jaws.
This Vise is a Cracker Jack for the Money. Manufacturers of Pipe Vises (ourselves included) have been slow in not getting on to fluted rollers for pipe jaws years ago.

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Complete stock of every size and kind. Quality the best that can be made. B.B. Ornamental Pipe Straps, all even, clean cut, brightly tinned. Ask for catalogue and prices.

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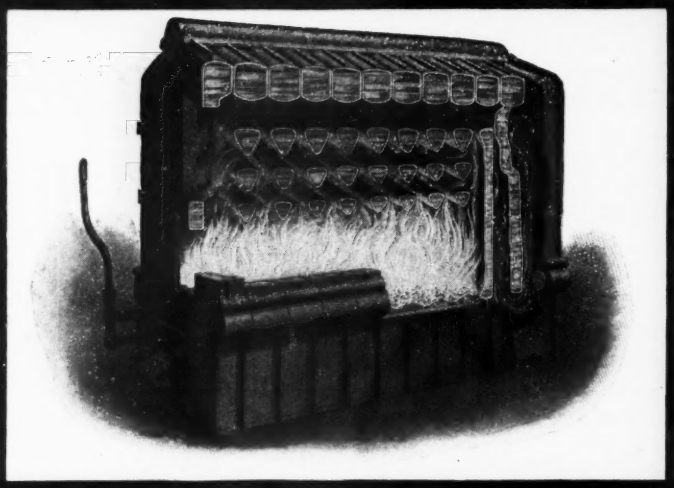
FOR STEAM AND WATER HEATING.



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QUICKLY SET,
TIGHT JOINTS,
EASILY MANAGED.

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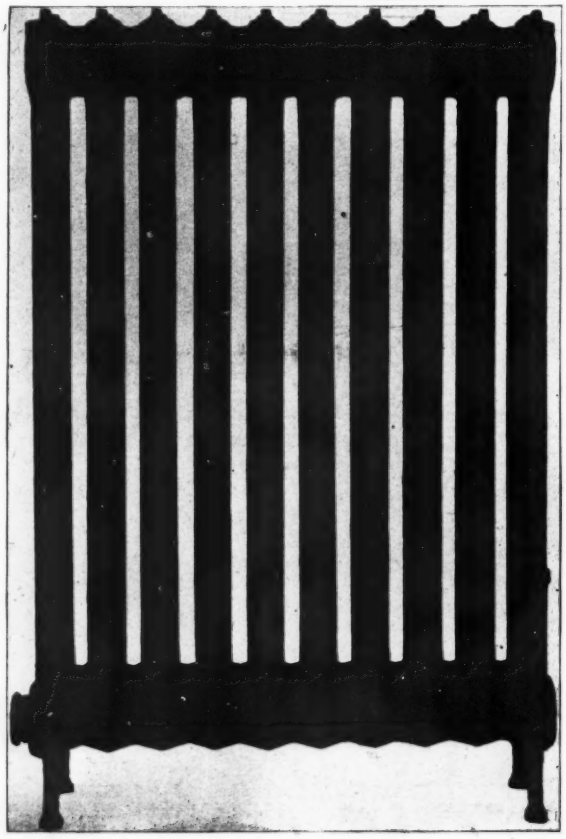

THE UNITED STATES RADIATOR CO.
DUNKIRK, NEW YORK

presents these two views of a 10 loop 38 inch water radiator, made from their new pattern

The
TRITON
TWO-COLUMN

The loops contain four square feet and are 2½ inches apart; their design makes them easy to bronze and decorate, and easier to keep clean.

The same points apply to 1, 3 and 4 column
TRITON RADIATORS,
as they are the same design and decoration.

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DOMESTIC ENGINEERING

Plumbing : Heating : Lighting :: Ventilating

Whole No. 138 *APRIL FIFTEENTH, NINETEEN HUNDRED AND ONE* *Vol. 21, No. 1*

Plumbing and Household Sanitation—IX.

A Course of Lectures which, when completed, will cover the theory and practice of the art

By J. Pickering Putnam, of Boston, Mass.

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Copies of issues of Domestic Engineering containing the seven previous installments may be had at 20 cents each.

Self Siphonage and Momentum.

Self siphonage takes place when the waste water flows through the trap "full bore" from the fixtures. As usually constructed wash basins have outlets far too small in proportion to the size of the waste pipe and trap. The strainer cuts off a considerable portion of the passageway, and the hairs, lint and other sediment which soon invariably collect on the strainer cut off another large portion, leaving an outlet sometimes not more than equivalent to a half-inch or five-eighths-inch pipe. The waste pipe and ordinary S-trap are usually 1½-inch or 1¼-inch in diameter, so that the stream of water admitted to flush and scour them is reduced to less than a quarter or a sixth of their capacity, and we wonder why our trap and waste pipes are never thoroughly scoured. An S-trap is no more self-cleaning when the water stream admitted is less than a quarter or a sixth of its capacity than would be an ordinary pot trap having a stream of the same size relatively to itself passing through it. In other words, a 1½-inch S-trap attached to a ½-inch waste flowing "full-bore," or to a waste having a ½-inch inlet, is no more self-scouring than would be a 3-inch pot trap attached to a 1-inch waste also flowing full bore, and therefore such an S-trap becomes practically then a "cesspool" trap.

This is a consideration of great importance, but one which appears generally to be lost sight of, and our plumbing laws are defective in not recognizing it. It is one of the principal causes of the collection of sediment in branch wastes and ordinary S-traps which have a false reputation of being universally self-scouring. They are evidently only so when properly set, and when the waste water from the fixture is permitted to flow through them rapidly and "full bore." It cannot pass through the trap rapidly unless it is set at some little distance below the fixture. It cannot pass rapidly "full bore" unless the outlet and strainer give an open water way as great or greater than that of the waste-pipe and trap. It should be greater in order to allow something for friction and sediment. A trap having a very deep seal retards too much the rapidity and strength of the water current passing through it; hence it should be made as shallow as possible consistent with other requirements.

Assuming now that we have properly set our trap in such a manner that a rapid stream of water passes through it full-bore wherever the fixture is used in a legitimate manner, we shall find that, where an S-trap is used, a siphon is formed by the outflowing waste water, which, without ventilation, breaks the seal of the trap. Hence the vent must be placed either at the crown or near enough to it to break the longer leg of the siphon. The momentum of the falling water assists the action of self-siphonage, and it is necessary for perfect protection against these two forces to vent very near the crown.

To make a practical test of the truth of this I had a wash basin fitted up with an outlet large enough to fill a 1½-inch waste pipe and S-trap full bore. Through this outlet the basin was emptied in 2¾ seconds, and the seal of the trap was completely destroyed by the siphonage and momentum of the falling water. The trap was an ordinary cast-lead trap, having the usual seal of 1¼ inches, and was connected with a waste pipe of the same size with the bore of the trap. With a waste pipe very much larger or smaller than the bore of the trap the seal is not so easily broken by self siphonage for obvious reasons.

Sediment Collection in S-Traps Converting Them Into Cesspools.

Experiments on Flushing and Sediment Collection.

In order to ascertain if the smallness of the outlet of a fixture could actually convert an S-trap into a cesspool trap as I have above asserted, and to study the effect of ventilation in removing deposits from cesspools, I have made a number of experiments on sediment collection and removal. I believe all unprejudiced and well informed sanitarians now admit that the special vent pipe is no longer to be recommended as a protection against siphonage, for the reasons I have mentioned. All admit, however, that the main stacks of soil pipe should be thoroughly vented at head and foot. The object of this is to dilute the gases of decomposition to such an extent as to render them as harmless as possible, and then to remove them from the premises. Liberal ventilation hastens somewhat the oxidation of the foul matters in the pipes, but not enough to form an active agent in removing solid impurities.

There has been nevertheless a great deal of misunderstanding and idle theorizing on this subject among writers and practitioners in sanitary plumbing. There are advocates of indiscriminate venting who profess a preference for air pipes even to a thorough water scour, the most radical ones going so far as to affect for the latter comparative indifference, saying, "If compelled to choose between oxygen and suds, we should give the former preference every time."*

Let us now, therefore, abandon theories and authorities and seek for facts to guide us in forming an independent judgment on this very important question. The only question, then, now in dispute is: Do traps and branch waste pipes require the application of special vent pipes to prevent an accumulation within them of solid deposits and corrosive gases?

The first experiments were made on solid and the second on gaseous impurities. Under the first heading it was necessary to determine, first, if and to what extent the removal by oxidation of the refuse matters in our waste pipes goes on under a ventilating current under the varying conditions possible in practice; second, at what rate the accumulation of sediment or solid deposit goes on under the same circumstances; third, to what extent a water scour is able to prevent and remove solid deposits without the aid of the special vent pipe, and fourth, to what extent traps and branch waste pipes are self-ventilated without the aid of the special vent pipe in good plumbing practice.

The first tests were made as follows:

I had pipes evenly coated with deposits found in house-drain pipes and under the conditions met with in ordinary practice, and made, first, a series of extremely delicate and careful experiments to determine the value of air currents in pipes as a scouring agent.

The maximum rate of this scouring or cleansing was first ascertained by performing the tests under all those conditions which are found to be most favorable to it. Thus the rate of oxidation is greatest when the ventilating current is most rapid, when the temperature is highest and when the largest surface is exposed to the current.

The first experiments were, therefore, performed under these conditions. The waste pipes used were of the diameter of ordinary branch wastes, 1½ inches, and were 6 inches long. They were connected with a heated flue by means of an ordinary 1½-inch vent pipe in the manner usual in practice, so that the ventilating current should traverse the pipes to be tested from end to end. The time of the year was in midwinter in January and February.

The pipes were uniformly smeared on the inside with substances found in house drains, using, in some, common soil from a soil pipe, and in others soap solutions found in lavatory wastes. The deposits were first thoroughly dried in the pipes in order to enable them to be accurately weighed in the laboratory, and they were afterwards moistened three times a day throughout the tests, about as they would be in ordinary practice.

The weight of the deposit in the pipes containing soil was 3.652 grains. That of the lavatory waste was 3.1685 grains. The deposits were then thoroughly moistened with clean water applied with a dropping tube and the pipes connected with the ventilating flue. The velocity of the air current passing through them was then accurately measured and found to be very strong, averaging 8 feet a second, and this velocity was maintained throughout the whole series of tests by means of a stove connected with the main flue, into which the ventilating flue opened. This movement is evidently as rapid as would ever be met with in plumbing practice. The thermometer at the pipe during the tests averaged about 80° F.

Great care was taken throughout to ensure that no foreign substance whatever should get into the pipes tested. No dusting or sweeping was allowed in the rooms and only pure water was used to moisten the deposits. An evaporation of the water used would show a weight of bacteria and other solid matter too small to be detected by our scales. In short, every precaution was taken to obtain reliable results.

After an exposure of a week, under these conditions, to the air current, the pipes were again placed in the air bath for an hour, and the deposits in them thoroughly dried at a temperature of 230° F. Upon weighing it was found that both deposits had gained in weight. The soil had gained 0.4955 grams and the soapy mixture 0.0130 grams.

The tests were then repeated under the same conditions for a second week. This time the gain of the soil was reduced to 0.4775, and the weight of the lavatory waste was increased to 0.0315 grams.

The bacteria of decomposition and nitrification had evidently not put in their most effective work, and it is probable that the condition as to light and moisture are not favorable for it. So far the air passed through the pipes was pure air from the room. In the next experiments the ordinary air from the house soil pipe was used and its velocity was 7 feet per second. At the end of a week the soil had lost 0.0575 grains and the lavatory matter 0.0352 grains, which was equivalent in the first case to 1-70th of the entire weight of the deposit and in the second to 1-100th part. Either of these amounts dissolved in water and spread uniformly over the surface of clean pipes of the size of those used was found to be altogether imperceptible to the eye, and the complete purification of these pipes by ventilation under the most favorable circumstances would at this rate require from 70 to 100 weeks, or from 1½ to 2 years, supposing there were no addition made to the deposit during the interval through use of the fixture.

We then made the tests with the deposits kept dry as might be the case in pipes under fixtures temporarily in disuse, with approximately the same results, and from all the experiments we reached the conclusion that the solid deposits in the interior of soil and drain pipes are removed so slowly by the oxidation produced by ventilation as to be practically valueless.

The second point investigated, namely, the rate of accumulation in pipes of deposits in ordinary plumbing, required no special experiments. We have ample data in our everyday experience in plumbing. Considering, first, the worst conditions, namely, those of the cold waste pipe from the ordinary kitchen or pantry sink, we know that

*See James C. Bayle's, in the "Sanitary Engineer."

the accumulation of grease in these will be so rapid as to entirely clog up the pipes in a short time where special precautions are not taken to flush out the pipes from time to time with hot water or some solution of caustic alkali, or where sinks constructed on the principle of an automatic flush tank to be hereafter described. So far as the ventilating current is concerned, however, its well known and generally admitted tendency is to congeal the grease and increase the clogging rather than to diminish it.

Consider next the case of an ordinary soil pipe. We find that the tenacious soil will adhere stubbornly to the pipe in masses where it strikes until it is washed away by a powerful fall of water, and that it is not equally distributed in a thin film all over the surface. Parts will be found which are never touched by the waste matter, and parts which are alternately fouled and then scoured clean again. Generally large masses of deposit will be formed in the cavities of the joints or in holes in the castings. In short, the deposits in soil pipe are not slowly distributed favorably for oxidation, but are formed in lumps suddenly, and are either as suddenly removed by the flushing water or are deposited in cavities which largely screen them from the influence of the ventilating current, and therefore in this case also the influence of aeration in removing the solid matter is comparatively very slight. The accumulations of heavy matter will continue in time to increase until they leave an opening only large enough to allow room for the ordinary water flushing stream to pass.

Take next the waste pipe from a lavatory. We find the solid deposits here of two kinds, one collecting in clots or masses in corners or unscoured areas, as of lumps of soap, hairs, lint, etc., and the other coating the pipes in thin films as of soap-suds. The former are deposited suddenly, and are either swept away by the water or caught in the unscoured cavities and remain there, partially screened from the air-current until other similar substances accumulate above them. The ventilating current, therefore, can have no appreciable effect in removing these masses of matter.

Where, on the other hand, the traps and waste pipes are so constructed and flushed that no such masses can collect, the only kind of deposit that can form in the interval between the flushing will be of the second kind, namely, a thin film of matter like soap-suds, and this the next discharge will remove.

It remains to be seen what effect a powerful water-flushing has on these deposits, and this brings us to our third consideration.

Water Flushing.

In order to obtain a direct comparison of the relativ value of a thorough water and of the greatest possible air flushing, the same pipes, tested as already described under the air current, and containing identically the same deposits, were next tested under a good water flush. They were attached to a properly constructed lavatory, as shown in Fig. 74. and cold water was discharged through them in the usual manner. Although the deposits were dry and hard they were almost entirely washed away after ten discharges. After fifteen discharges the amount of deposit left on both pipes was less than half a grain. When the substances were soft on the application of the test they were removed at once and entirely by a single discharge.

From these investigations we have found that the water flushing was infinitely more rapid and thorough in its cleansing power than the air flush. Now there is nothing to prevent every lavatory from being so constructed as to properly flush the waste pipes at each discharge. In fact there are a great many reasons why it should be looked upon as an absolute necessity in good plumbing.

Fig. 74. Experiments on Water Flushing.

Hence special trap and branch waste vent piping is, for the purpose of removing solid deposits, not only inefficient, but also entirely unnecessary.

We come now to the fourth consideration:

Self Ventilation of Traps and Branch Waste Pipes.

Pipe Systems may be amply Ventilated without the use of "back vent" pipes.

But supposing it had been shown that special trap ventilation were necessary instead of the reverse, it would still be superfluous to apply the special vent pipe, because the ventilation in proper plumbing is thoroughly accomplished without it, and in several ways.

If our main stacks of pipes are open above and below, as they should be, and thus thoroughly aired, the branch wastes will be ventilated in the first place by the well known law of the diffusion of gases.

In the second place, a movement of fluids up or down the main stack creates in the branches suction strong enough sometimes even to destroy the seal of ordinary traps. This suction, be it strong or feeble, always produces an interchange of air in the branches.

Finally, a third and still more important way in which natural aeration is produced is by the usage of the fixture itself. Every time the water is discharged a column of pure air is drawn from the room into the waste pipe after the water column. Everyone has observed how the air follows the water, and is drawn through it in the form of an inverted cone or funnel, generally with a loud sucking noise. When the fixture is properly constructed, with an outlet large enough to fill the waste pipe "full bore," a column of air equal to the size of the water column is drawn after it, completely filling the waste pipe with pure air from the room. In short, ample air follows every discharge to accomplish all that the soil pipe air of the trap vent could do in the interval between the usages of the fixture. The pure air from the room could not possibly be rendered so foul in the interval as the soil pipe air would be, as they are constructed to-day, before it entered. This is equally true whether the fixture be used often or

seldom, provided it be properly constructed and set, and whether the branch waste be long or short.

Thus the special trap vent is superfluous for scouring, not only because the traps may be fully vented without it, but also because a good water flushing accomplishes all and infinitely more than the air could do.

Removal of Gaseous Impurities.

The chief difference between the main soil pipe and the small branch wastes in relation to venting is that the foul air in the former cannot, and in the latter case can in good plumbing, be thoroughly changed by flushing and diffusion. Hence, in the main wastes, special venting is necessary to remove gaseous impurities and in the small branch wastes it is not. What has already been said in regard to the capacity for the removal of solid impurities from the smaller waste pipes of a good water flush, holds with still greater force in relation to gaseous impurity. The lighter gases are instantly removed by the water stream and replaced by pure air from the room, and this substitution is as much more desirable than the substitution of soil pipe air as the former is richer in oxygen and freer from injurious elements than the latter.

A History of Water Closets—IV.

From "A Book on Water Closets," by Glenn Brown, of Washington, D. C.

THE subject of water-closets that were in use before the year 1800 was reviewed by the author in a paper read before the Sixteenth Annual Convention of the American Institute of Architects, printed in preceding pages. In the following sections I will treat of the forms or patterns that have been used between 1800 and the present time, covering a period which has been remarkably prolific in mechanical inventions and contrivances. It would be neither useful nor profitable to describe all the inventions for which patents have been issued on this device; but those will receive due attention that have either merit in themselves, or have merits or demerits that in the opinion of the author bear upon the many patterns of closets now in use.

Classification.—Water-closets may be divided into the classes in which they naturally fall. This mode of classification was first used by Mr. T. M. Clark, in his article on "Modern Plumbing," published a number of years ago. The "valve-closets" include all that have a valve whose points of contact with the bowl or additions thereto form a water-tight joint. The valve keeps a certain quantity of water in the bowl.

"Pan-closets" include all that have a dish-shaped basin or pan at the bottom of the bowl. The pan forms a water-seal with the bowl or a projection therefrom.

"Plunger-closets" include all that have a plug or plunger fitting over or into the entrance of the trap or soil-pipe; by this means any required amount of water is kept in the bowl.

Among "hopper-closets" I include all that have a simple bowl and no mechanical contrivances other than a water-seal to keep the sewer-air of the soil, drain or sewer pipes from entering the house.

Under the head of "latrines" are classed all rows of closet-bowls which are in reality one receptacle, having one outlet or junction with the soil-pipe, and a trap, plunger or valve common to them all.

There are a small number of water-closets that will deserve notice, which cannot be properly placed under either of the above classes.

Among the early inventions, by far the greater number were for valve-closets. It is probable that hopper and pan-closets were in use before the invention of valve-closets, while there is postive evidence of the plunger-closet being in existence and use before the invention of either the Cummings or Bramah closets.

VALVE-CLOSETS.

Valve-closets may be treated of under the head of sliding and hinged valves, the latter being by far the most useful and numerous type of this class.

It is sometimes difficult to decide, when the pan is intended to fit tightly against the receiver, whether a closet belongs properly to the valve or the pan class; so under this head I describe only those that have valves properly so called. The object of the valve is to intercept any sewer-air or organic germs that may come from the traps, soil, drain or sewer-pipes, and at the same time to keep the bowl filled with a certain amount of water, about half-filled in most cases. The large volume of water deodorizes the fecal matter discharged into it, and at the same time it prevents the bowl from becoming soiled.

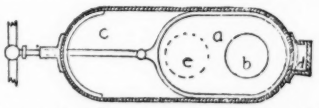


FIG. 34.—VALVE AND RECEIVER OF LUCKNOW'S CLOSET.
a, Slide-valve. *b*, Hole in valve. *c*, Receiver. *d*, Overflow. *e*, Soil-pipe. *f*, Pull-rod connected with hand-pull.

In connection with these closets we always find a compartment between the bowl and soil-pipe, in which the valve either slides or works on its hinge or spindle. This closet must of necessity have an overflow.

In early times these closets were supplied from a special cistern placed over and above the closet; now they are supplied either from the main supply or from special cisterns. The water-supply is generally turned on into the bowl, and at the same time the valve of the closet is opened by one and the same lever. The largest number of patents are issued for novelty in the manner of combining these cranks, wires and levers with the hand-pull; in some cases the inventions are only remarkable for the complication of their mechanism, the inventors forgetting that the foundation of their usefulness is simplicity.

Sliding-Valves.—The sliding-valve closets have the first closet patented in Breat Britain in their class. (See Cummings' closet.)

Lucknow's Closet.—The only patent issued for a valve similar to the Cummings' valve was issued to John Lucknow in the year 1854 by Breat Britain. This closet has a sliding-valve, with a circular hole of the same diameter as the soil-pipe in one end. When the valve has been drawn back as far as possible, the two holes coincide, and the waste matter in the bowl is precipitated into the soil-pipe. The sliding bar which operates the valve is connected with the hand-pull.

Viney's Closet.—In the year 1824 there was a valve-closet invented in England by James Viney, that was the first of another type belonging to this class. The valve in this closet might be called a sliding gate, that slides up and down in a vertical position. The valve has grooves or guides in which it works. The bowl is kept partially full of water when the valve is closed. The compartment

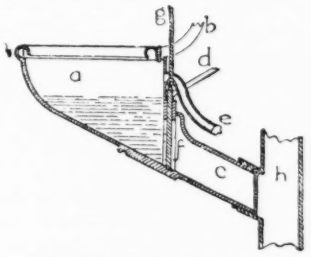


FIG. 35.—VINEY'S CLOSET.
a, Bowl. *b*, Supply. *c*, Outlet to soil-pipe. *d*, Vent to valve-compartment. *e*, Overflow. *f*, Valve. *g*, Rope or chain. *h*, Soil-pipe. *i*, Flushing rim.

in which the valve works is ventilated, and the branch from the water-closet has a flap-valve where it enters the soil-pipe. The vent and overflow pipes run directly through the wall and have their ends open on the outside of the building. This closet has a minimum of space devoted to the valve-compartment, having a large body of water to flush the drains and no water-seal trap under it, so it would be an excellent closet according to Mr. Norman Shaw's ideas. A valve of this kind and apparent weight would be liable to fail from waste matter catching in the grooves, and in this manner preventing the gate taking a proper seat. In this closet I note, also, the earliest flushing rim that extends around the bowl in an annu-

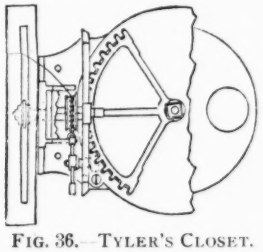


FIG. 36.—TYLER'S CLOSET.
Top view with bowl and part of valve-chamber removed.

lar ring, and has an outlet so arranged as to flush and scour all parts of the bowl.

Hanson's Closet.—A patent was issued by the United States in 1882, to E. Hanson, for a sliding valve that is intended to slide across the outlet of the closet, retaining its vertical position, similar to the valve on the closet of S. N. Grubb, but sliding up and down vertically, instead of horizontally, as in the case of the latter. (See Fig. 40.)

Tyler's Closet.—In 1829, Hayward Tyler, a Quaker, and a brass-founder of London, invented a closet with a horizontal sliding-valve that rotates on a pivot. The valve consisted of a circular disc with a hole in one side of it, which had the same diameter as the soil-pipe. When the disc is turned so that the hole in it coincides with the

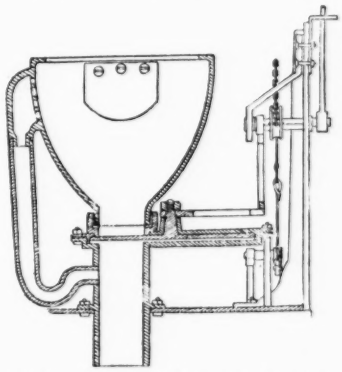


FIG. 37.—TYLER'S CLOSET.—SECTION.

opening in the soil-pipe or trap, the contents of the bowl are emptied directly into the soil-pipe. Motion is imparted to this valve by a hand-lever connected to a vertical toothed quadrant, that has its axis at right angles to and its teeth geared with, a horizontal quadrant. The axis of the horizontal quadrant is also the pivot on which the valve turns, so that any movement of the hand-lever will cause the valve to rotate on its center. In this closet the valve-compartment is small and it does not act as a receiver for filth, the waste matter passing directly into the soil-pipe or trap; but the machinery is very complicated,

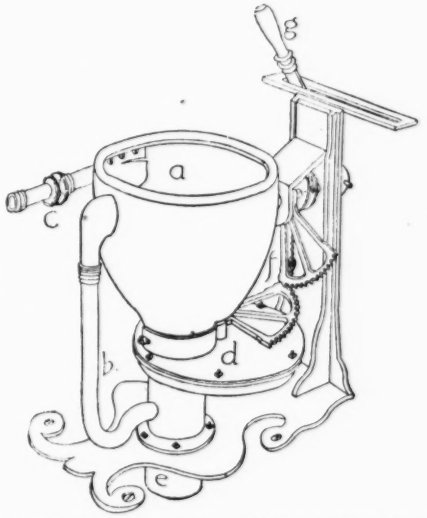
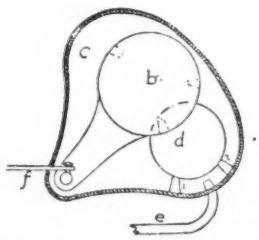


FIG. 38.—TYLER'S CLOSET.—PERSPECTIVE VIEW.
a, Bowl. *b*, Overflow. *c*, Supply. *d*, Valve-compartment. *e*, Entrance to soil-pipe in trap. *f*, Geared quadrants. *g*, Lever.

and for this reason liable to get out of order and to require intelligent supervision, which is rarely expected from the householder, and never from the servants. I note three water-closets invented in the United States with pivoted horizontal sliding-valves: S. N. Grubb, 1879; F. Watson, 1880; J. Robertson, 1881.

Grubb's Closet.—In Grubb's closet and in the other two mentioned above, the only difference being in their details and in the manner of working the valves, is a disc that has a diameter a little greater than the opening in the soil-pipe. This disc is attached to one end of an arm, while at the other end is the pivot on which the valve rotates. The valve has



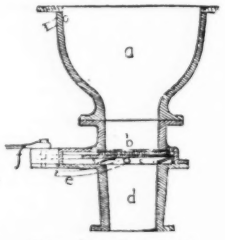
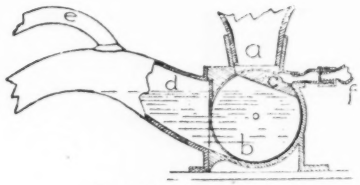


FIG. 39.—SECTION OF VALVE-CHAMBER. FIG. 40.—SECTION. GRUBB'S CLOSET.

a, Bowl. *b*, Valve. *c*, Valve-compartment. *d*, Entrance to soil-pipe or trap. *e*, Supply-pipe to valve-chamber. *f*, Rod connecting with hand-pull. *i*, Springs.

springs to press it tightly against its seat, and a branch from the supply-pipe to wash off the valve and to wash out the valve-compartment. The supply-valve is worked by the same pull that rotates or slides the valve.

Wilkin's Closets.—There was a curious sliding or turning valve closet invented in England in 1846 by one J. W. Wilkins. The receiver was a cylindrical box in which worked a cylindrical valve, a section only being solid. This



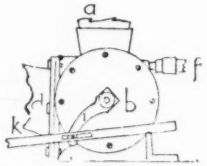
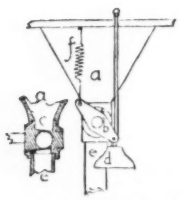


FIG. 41.—SECTION. FIG. 42.—SIDE VIEW. WILKIN'S CLOSET.

a, Bowl. *b*, Receiver. *d*, Trap. *e*, Vent-pipe. *f*, Supply to valve. *i*, Crank. *k*, Lever connected with pull rod.

solid part of the valve was kept in position by a weighted lever, so as to form a bottom for the bowl of the closet; when the lever was raised, it turned the solid part of the valve away from the bottom of the bowl, dropping its contents into the receiver. In connection with this closet I find for the first time a vent-pipe connected with the crown of the trap. The specifications claim it as a novelty.



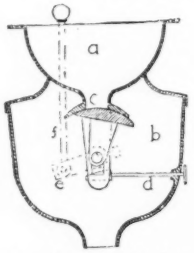


FIG. 43.—NORTON'S CLOSET. FIG. 44.—DAGGETT'S CLOSET.

a, Bowl. *b*, Crank. *c*, Valve. *d*, Weight. *e*, Soil-pipe. *f*, Spring. *a*, Bowl. *b*, Receiver. *c*, Valve. *d*, Set-screw. *e*, Crank. *f*, Pull-rod.

Norton's Closet.—The two following closets, which work on the same principle as the Wilkin's, were invented in the United States in 1876 and 1882, respectively. Norton, in his invention, applied the principle of a ground-cock to the valve of a water-closet. The valve is simply a piece of conical metal with a hole the same diameter as the soil-pipe, which, when turned so that they will be concentric, will allow the waste matter in the bowl to pass into the soil-pipe. The valve is kept in position by the aid of a weight and spring, as is shown in the cut.

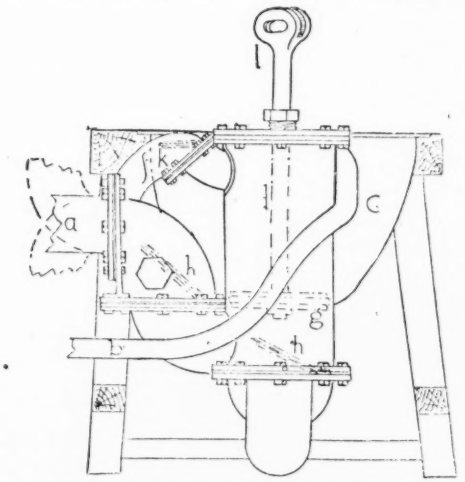


FIG. 45.—END VIEW.—DOWNTON'S CLOSET.

a, Discharge-pipe. *b*, Supply-pipe. *c*, Bowl. *d*, Cylinder. *f*, Vent-pipe. *g*, Piston. *l*, Place for handle. *h*, Upward valve. *i*, Hand-hole. *k*, Vent-pipe.

Daggett's Closet.—Daggett's closet, in the action of the valve, is almost identical with the one invented by Wilkin's. The valve is a segment of a cylinder that revolves on its axis. This valve is operated by means of a crank attached to the hand-pull. When the valve has revolved to a certain distance, it leaves the orifice at the bottom of the bowl open. This closet has a screw with the handle on the outside of the receiver, so the valve may be made to press more firmly against its seat if it should become loose.

Sliding-valve closets seem to have been in actual use to a very limited extent, the reason probably being that the inventors or manufacturers found that they would not work in practice, it not being practicable to make the valve slide when and where the operator desired. It would

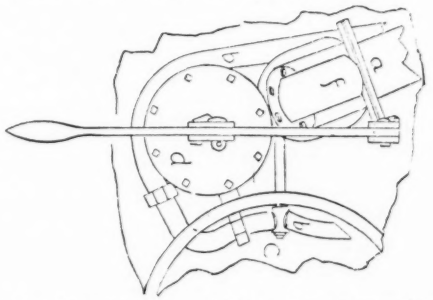
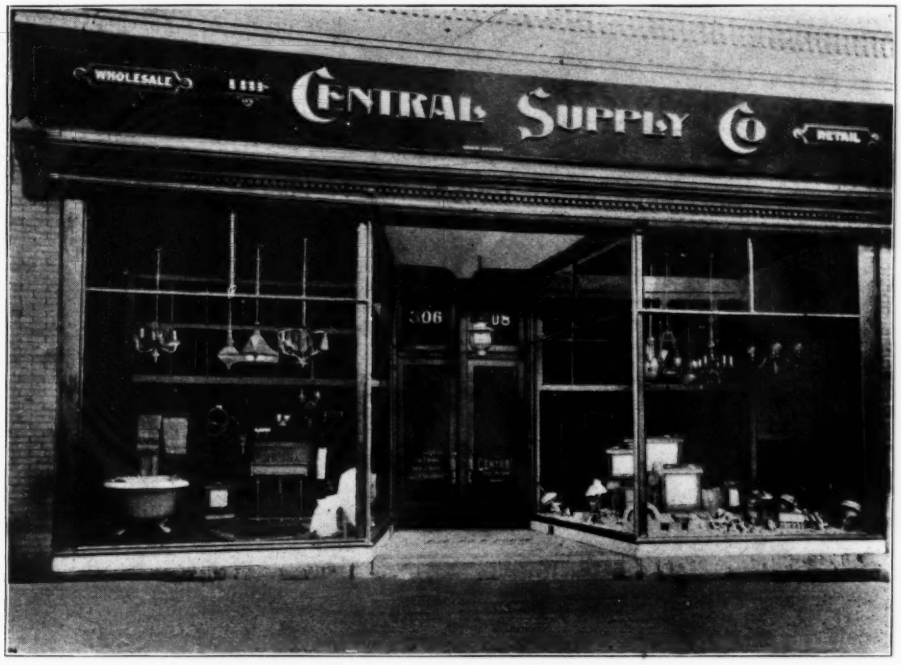


FIG. 46.—PARTIAL VIEW OF TOP.—DOWNTON'S CLOSET.

be almost impossible to adjust the parts so they would have a water-tight joint for any length of time. The hinged valve-closets are generally simpler in their construction; a tight joint with this form of valve is more practicable, and there are a large number of the hinged type of valve-closets in use at the present day in all parts of the world.

Sanitary Fittings and Plumbing.

SO many books have been written on the sanitation of buildings, that the student may be inclined to think that there is no necessity for a series of articles on sanitary fittings and plumbing. This view might, perhaps, be correct if sanitation were an unprogressive science, but this is not the case. During the last quarter of a century sanitary science has progressed by leaps and bounds, and it is still progressing. The books of twenty years ago are now practically useless, and probably twenty years hence the books of to-day will also have been relegated to the limbo of forgotten lore, or will have been edited and revised till they are scarcely recognizable. Every year our knowledge becomes more exact and more complete, and every year new fittings are invented and old fittings improved, so that all architects must be students so long as they remain in practice, or must be content to be dubbed "old fogeys" and to be pointed at as being behind the times.



One View of Central Supply Company's Show Windows at Columbus, O.

The wonderful increase in our knowledge of the causation of many diseases is one of the most marked features of recent years, and although very much indeed has yet to be learnt, sufficient is known to admit of practical application with beneficial results. The germ theory of disease is no longer regarded merely as a plausible hypothesis, but is accepted as a fact which is becoming every day more significant. "Find the microbe" is the key to as many enigmas as "*Cherchez la femme.*"

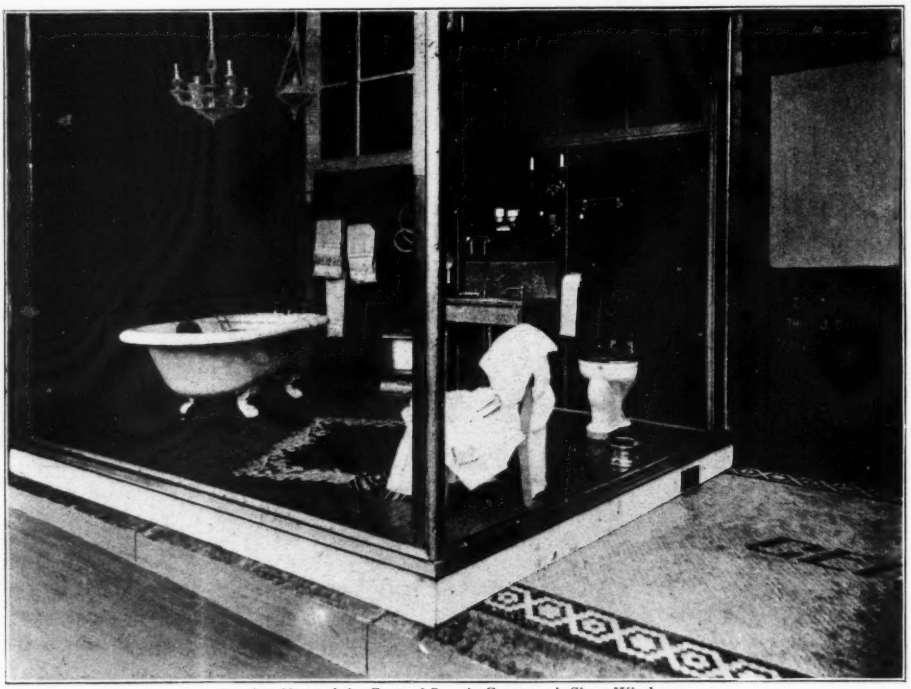
The important effect which this one fact must have on practical sanitation has scarcely yet been sufficiently recognized. The aim of sanitary science must be to remove from buildings and their appurtenances all conditions which contribute to the growth and distribution of pathogenic organisms, and, as far as possible, to provide those conditions under which such organisms can not exist. This is a difficult problem, and cannot be solved until the life-history of every disease-producing organism has been thoroughly studied. Something in this direction has already been accomplished, but the knowledge which has been gained shows clearly that the solution of the problem will not be easy. Dr. Sidney Martin's experiments with the typhoid bacillus show that this soon dies in "virgin" soils, whether these are sandy or peaty, but that it rapidly multiplies in moist sterilized samples of soils from gardens and other cultivated places, and retains its viability and vegetative properties for months and perhaps years. Moist sterilized soil which had been impregnated with the typhoid bacillus was found to contain the bacillus at the end of 456 days. The soil was then naturally dried for forty-nine days till it "could be readily powdered into a fine dust;" the bacillus was still there. Other experiments showed that the bacillus spread through the soil in different directions.

Experiments with sterilized soils are, however, of little practical use. It is more important to know how long the typhoid bacillus can survive in soils containing other bacteria. No definite statement on this point can yet be made, but there is reason to believe that, while in many cases the typhoid bacillus may be overcome by the other bacteria in the general struggle for existence, in some cases it will live and retain its dangerous properties for months. In a recent report on "Enteric Fever in the City of Chichester," Dr. Theodore Thomson and Col. J. T. Marsh, R. E., came to the conclusion that the most probable cause of the re-

peated recurrence of enteric (typhoid) fever in this city is the foul condition of the soil, due to the "leaky cesspools and cesspit-privies, which, until some three years ago* formed the sole methods of disposal of all its excrementitious matters."

The lessons to be learnt from these and other investigations are that some pathogenic organisms are not by any means so short-lived as is commonly supposed, that they may spread rapidly under suitable conditions, and that they may exist for a considerable time even in dust so dry as to be blown about by the wind. The degree of temperature at which most rapid growth occurs differs, but most bacteria develop at the temperatures which are ordinarily maintained in inhabited buildings, while some (among which the typhoid bacillus is unfortunately found) can, in the words of Dr. Newman, "withstand freezing for weeks."

Moisture almost invariably favors the growth of bacteria, but some species can exist for a lengthened period in a dry medium. Sunlight, on the other hand, retards the growth of bacteria, and is often positively fatal to them, particularly in the presence of oxygen.



Another View of the Central Supply Company's Show Windows.

The practical application of the knowledge gained by medical experts is the problem which confronts the sanitarian, whether he be architect or engineer, and in attempting to solve this problem, the importance of sunlight and fresh air must not for a moment be forgotten. These are the natural germicidal agents which he must endeavor to utilize to the best advantage. It is also essential that rooms containing sanitary fittings should be so constructed and arranged that they can be kept scrupulously clean with the least possible trouble. Accumulations of dirt or dust in dark, unventilated rooms generally constitute suitable soils for the growth of bacteria.

*This was written in 1899.

But however satisfactory the rooms containing sanitary fittings may be, great danger will exist if the fittings themselves are not of a suitable character, and if the plumber's work in connection with them is not properly executed. Untold harm has resulted from the fixing of water-closets and other fittings of faulty design by unskilled workmen under more or less ignorant supervisors. The harm has not always been confined to the occupants of the houses containing the fittings, but has often spread throughout the community. Many towns to-day are paying the penalty for previous misdeeds.

Even some of our health resorts have shown an almost criminal disregard of sanitary requirements. Two examples will suffice for our purpose. In his report (dated January 30, 1900) on "Epidemic Enteric Fever in he Borough of Falmouth," Dr. G. S. Buchanan writes: "Excrement disposal is almost everywhere effected by water-closets. Most of these closets are provided with flushing-boxes or flush-tanks, but some 200 are without flushing apparatus. The latter 'hand-flushed' closets are apt to become exceedingly foul. . . . At the date of my visit the occupants of a few of the larger private dwellings in Falmouth were having their house-drains exposed for examination. In each instance where I had an opportunity of seeing these house-drains they were seriously defective; thus, joints of pipe-drains were leaky . . . soil-pipes were inside the house and unventilated, sink waste-pipes led directly to the house-drains. . . ." In a later paragraph he says: "Soil-pipes are habitually unventilated* . . . Much of the recent plumber's work which I saw also seemed unsatisfactory."

*In the next paragraph Dr. Buchanan modifies this statement by saying that "new soil-pipes have *in most instances* been provided with ventilating shafts." The italics are ours.

In March, 1899, Dr. Buchanan, after a serious outbreak of diphtheria at Tunbridge Wells, wrote: "House-drains are rarely trapped from the sewer, and frequently they are ventilated only by means of rain-water pipes which open just below the eaves. Often, I was informed, waste-pipes opening within the dwelling are connected directly with the house-drain. . . Within the small dwellings commonly the only drain is a sink-pipe, which discharges its contents outside the building over a bell-trap. These bell-traps are usually defective. . . . In houses of better class are occasionally found water-closets provided with objectionable D-traps, and soil-pipes of water-closets often are unventilated. As a rule in smaller house property each dwelling has belonging to it a water-closet placed outside the building. A majority of these water-closets are without apparatus for flushing; being of the 'hopper' type, and getting merely an occasional 'flush' from a water-can, they often become filthy. In one row of houses I found closets of this sort built in the basement of the house, opening into the kitchen."

Third View of Central Supply Company's Show Windows.

These instances serve also to show that, however much knowledge of sanitary fittings and plumbing there may be in the country, the practical application of this knowledge has been, and still is, far from adequate. Every architect, who has to carry out alterations of houses, meets many instances of glaring defects even in buildings which have been erected in recent years. These defects are often due to ignorance or carelessness, but in many cases the blame must rest on the owner of the houses, for having demanded cheapness (however nasty) instead of efficiency. The architect unfortunately has to deal with many clients of this nature, and is often thwarted in his endeavors to do good work, even though he points out that cheapness in first cost almost inevitably entails excessive expenditure in repairs and alterations, and perhaps in doctors' bills.

Statistics as to the incidence of disease in houses provided with water-closets and in houses with pail-closets or privies are somewhat misleading, but it is not going too far to say that water-closets appear to be in many cases even more dangerous than the conservancy systems. Thus, at Gainsborough, according to the report of Dr. Darra Mair, twenty-five of the houses invaded by fever during twenty months of 1897-8 were provided with privies, five houses invaded were provided with pail-closets, and sixteen with water-closets. As there were 2,455 houses with privies (either separately or in common), 305 with pail-closets, and 1,300 with water-closets, the incidence of the disease was as follows:

In houses with privies..... 1 in 98
In houses with pail-closets..... 1 in 61
In houses with water-closets..... 1 in 81

It is not surprising to learn that "in some of the latter houses gross sanitary defects had been discovered in connection with the water-closets or the drains."

The following words by Dr. Farr, the eminent statistician, are worth careful consideration: "Almost coincidently with the first appearance of epidemic cholera, and with the striking increase of diarrhœa in England, was the introduction into general use of the water-closet system, which had the advantage of carrying night-soil out of the houses, but the incidental and not necessary disadvantage of discharging it into the rivers from which the water supply was drawn." In London the mortality per 1,000 from diarrhœe as .215 in 1838, .201 in 1839, and .238 in 1840 and 1841, an average of .223. In 1849 connection of drains with sewers was compulsory, and the death rate from diarrhœa became 1.705 in 1849, .813 in 1850, 1.085 in 1851, and .983 in 1852, an average of 1.146, or five times the death rate from 1838 to 1841. The average for the decade 1871-80 was, according to Dr. Ogle, .940 per 1,000, or very

little better than the rate for 1849 to 1852, and more than four times the rate for 1838-41. The number of deaths from diarrhœa in London for the ten years from 1871 to 1880 was 33,168. If the death rate of 1838-41 had been maintained during this period, the number of deaths would have been only 7,868. In other words, 25,300 lives appear to have been lost in London in 1871-80 from one class of disease alone, chiefly through mistaken "sanitation."

It follows from these premises that so-called sanitary fittings and plumbing are dangerous unless they are not only satisfactory in themselves, but are also connected with drains and sewers which are equally well designed and constructed. Everything must be so arranged that pollution of air, soil and water supply is reduced to the smallest possible amount. It is false economy to cut down the cost of sanitary work below a certain limit. Sanitary fittings ought always to be of good quality and properly fitted. If little money can be afforded, the number of the fittings must be reduced, as it is better to have one good water closet than (say) two bad waterclosets, or a bad water closet and a bad slop closet. Economy can also be effected by grouping the sanitary fittings together, and so reducing the length of the drains and the number of ventilating pipes, but this branch of the subject will be more fully discussed in the next article.—The Builder, London, Eng.

Sanitary Engineering in England.

THE beginning of another year has come without bringing with it anything wonderfully new with regard to sewage disposal, but for all that it has been a year of progress with many important works. We have looked in vain for the report of the Royal Commission; nor does there seem any immediate likelihood of its appearing. We hear a rumor that perhaps an interim report may be made during the course of the year; but it is only a rumor, and we are unable to speak with any certainty. One can but suppose that the commission are finding considerable difficulty in arriving at their decision, and this is no matter for wonder when it is realized that systems of disposal which act so well in some places fail dismally in others. The present action of Leeds does not seem to help matters at all. Here most successful experiments were carried out with bacterial treatment, the sewage containing in addition to its ordinary constituents, a considerable quantity of manufacturing refuse. Now, however, a bill is being promoted to obtain powers to take the sewage twelve miles, and, after some sort of treatment, to apply it to land. This certainly is not an artificial bacterial treatment pure and simple. We understand that already 1,890 acres of land have been acquired, and that the whole scheme involves an expenditure of about £650,000. On the other hand, towards the close of last year, the Local Government Board sanctioned a scheme of bacterial treatment at Southwold without any restrictions whatever, and throughout the country there is considerable activity in connection with the various forms of sewage disposal. The Scott-Moncrieff process has been further developel, the latest installation being for Lord Hillingdon, near Cromer; and experiments are being carried out to determine the relationship which exists between different periods of anaerobic change and susceptibility to nitrification in standard filters The Septic Tank Syndicate is carrying out a number of works, among other places at Exeter, Taunton, Wells, West Bridgford, Andover, Moresambe, Bramley, Limpsfield and Oxted, Thorverton and Itchen. Cromer has been provided with tanks placed under the promenade and entirely hidden. Installations have been arranged for in Holland, Belgium, Spain, New Zealand and the United States. Those at Vancouver have been completed and are in operation. A construction company has been formed for the introduction of the system into Holland, and sanction of the Local Government Board has been obtained for loans for works on this system by Yeovil, Walthamstow, Wells, Monmouth, Walton-on-the-Naze and Devonport.

After all, whatever method of sewage disposal is adopted, it is now fully recognized that the sewage is rendered innocuous by bacterial agency. It is the beneficent provision of Providence that this should be so. Had it been otherwise the world would have long since become uninhabitable. The wonder is that this natural action was not recognized and advantage taken of it before. It has become the custom to talk of bacterial systems of treatment as things separate and apart from all others. So they are in a way, because methods not used in other systems are employed. Yet it would be more correct to term them processes of treatment by means of artificially cultivated bacteria. Some of these even are of not such entirely modern use as is generally imagined. We have quite recently heard of an adaptation of artificial bacterial treatment which has been practiced in India for hundreds of years. The great palaces there have baths in every room, the water from which after being used is simply tipped on to the floor, where it runs away through a hole in the center and collects in a masonry-lined tank dug outside. This tank is filled with charcoal, and, of course, forms a bacterial bed. The application, however, apparently went no further. The average Oriental, be his nationality what it may, is far from cleanly in his habits. The result is that the plague and other epidemics are rampant. It is not surprising, therefore, to hear that many of the cities of India are doing what they can, by putting their sewage disposal works on a satisfactory basis, to counteract this evil. For instance, Bombay, where the plague was so very bad, and where there are 700,000 of native population very much crowded together, the system is being re-modeled, and the sewage turned into the sea at another and more satisfactory point. Poona is taking its sewage six miles to a sewage farm, and Surat is also having a sewage farm. From Cawnpore the sewage after treatment will be turned into the Ganges. Simla is laying down bacteria beds, and

here it is interesting to note that the sewage in being taken to these beds has a fall of 1500 ft. in a half mile. At Calcutta, also, new sewage works are in progress.

Possibly the largest sewage disposal works at present in progress anywhere—certainly in this country—are those of Glasgow. The whole scheme, to which we alluded in our last year's article, is now intended to deal with the sewage of 1,000,000 persons, and will cost some £1,250,000. The process used will be chemical precipitation, with subsequent filtration for the effluent, the resulting sludge being sent to sea. This process still remains apparently the most suitable method where there are large aggregations of population—and this in spite of all the knowledge which has been accumulated with regard to bacterial action. Another large scheme is that of Cardiff, where £200,000 is being spent. Derby has a Bill in Parliament to obtain powers for sewage disposal, using bacterial beds. Now that Bristol has made up its mind about its docks we are certain to hear something more in connection with the big scheme which was temporarily dropped last year. It will involve an expenditure of something over £700,000 and the sewage will be delivered direct into the Severn.

Sewage disposal works by different methods are also under construction or consideration at Deal, Herne Bay, Hayward's Heath, Pontefract, Tarporley, Colwyn Bay, Bilston and Bideford. At some of these places the works are practically completed.

Paris has been, and still is, in great trouble in connection with its sewage. We have described the condition of affairs several times. Sewage farms have been formed in unsuitable places, and, moreover, in some cases five times the amount of sewage which these farms were stated to be capable of dealing with has been put upon them. The result has been disastrous. Wells have been permanently polluted and the foundations of houses destroyed. The municipal engineers, when carrying out the schemes, stated that all the sewage would be treated before being delivered into the river, and that the farmers and the river would greatly benefit. As a fact the experiment has been such a failure that the crude sewage in quantities is still being poured into the Seine, and the farmers have found that though beetroot and other tubers grew to an amazing size, they could not get a good price for them since the quality was poor. They are combining to sue the municipal authorities for 300,000f.

It will be remembered that some little while ago we described the sewage disposal works at Sutton, Surrey. Here originally the sewage was roughly screened before being put upon the contact beds. This screening has since been done away with, and now the whole of the flow of sewage first of all passes through a lightly-covered scum tank, the capacity of which is equal to one-fifth of the daily flow. In this connection it is interesting to note that the septic tank at Belleisle, Exeter, has a capacity equal to about eighteen to twenty hours' flow. For the new works at Yoevil the tanks are to be equal to one and a half times the expected dry-weather flow. In experiments carried out at Manchester it was found that satisfactory results could be obtained if the capacity of the septic tank was one-half the daily flow. Results vary greatly with circumstances and locality. For instance, at Leicester, with an experimental septic tank, the capacity of which was nearly equal to one day's average flow, the results have not been at all good, and sludge has collected in large quantity. We may mention that at Exeter the gas generated in the septic tank is utilized for lighting the works by burning in conjunction with incandescent mantles. The gases are also used for heating a boiler which supplies steam to an 8 horse-power steam engine.

When considering the whole question of sewage disposal it is borne in upon us more and more that Nature never intended man to live together in large numbers or to stop continually in one place. As long as he is nomadic there is no sewage to worry about. Congregation in towns makes primitive methods of disposal on the site where produced out of the question. An abundant water supply does not add to the ease with which the problem may be solved. The employment of cesspits in towns—though their action in the country may be eminently efficient—is impossible with safety unless they are frequently cleansed. This process even is attended with disagreeable concomitants. At the beginning of the nineteenth century there was no proper method of sewage disposal. Here in London the cesspit was in extensive use and the overflow went into stinking ditches, where the fluid remained stagnant and spread disease. It was illegal at the beginning of the century to turn sewage into the various streams flowing into the Thames in London, or into the river itself. Indeed, water for drinking purposes was taken from the river both at Charing Cross and London Bridge. The permission to use these streams for sewage rendered matters better for the time, but the river gradually got into such a foul condition that in spite of the rigorous measures since taken both above, in, and below the city, the river has by no means recovered its ancient purity. London is, however, wonderfully healthy and well drained, and in a much better condition than Paris, in spite of its larger population. Other cities have the same troubles, and they are meeting them in their own way. Sewage disposal as we now know it is, without question, wholly the growth of the nineteenth century; and far advanced as is the science of to-day as compared with what it was one hundred years ago, the matter is still only just in its infancy.—The Engineer, London, Eng.

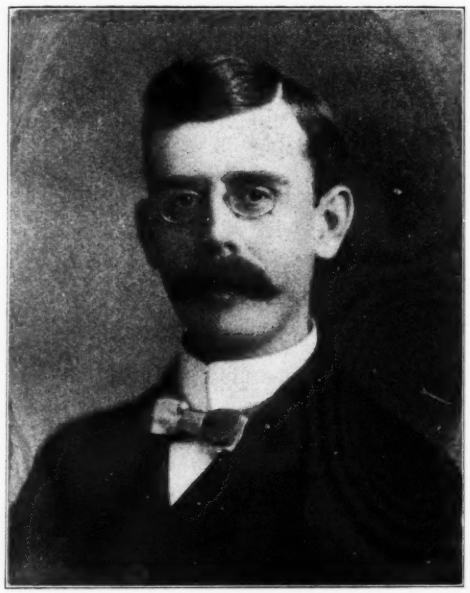
S. H. MORGAN,
Of Detroit, Mich. Delegate to the National Convention, N. A. M. P.

Reminiscences of the Plumbing Business—II.

By David Whiteford, a Veteran Chicago Plumber.

THE plumbing trade is different, in some respects, from most other trades. We are pre-eminently the servants of the people, ready to do their bidding at a moment's notice. We are to the people, in a certain sense, what the physician is to them. When a person is sick he calls the doctor. Just so when a pipe bursts, the householder calls the plumber; if the plumber is not in he "cannot wait," and off he goes for another. The people are not always sick; neither are their pipes always bursting; nevertheless if we wish to keep our customers and induce others to employ us we must have men, and these men must be paid; and unless we have a good deal of new work on hand it is sometimes hard to know what to set the men at. If, on the other hand, we keep no men and attempt to do all the work ourselves, we had better shut up shop and go to work as journeymen, for, in doing so, our pay will be much better. Therefore I say that our charges ought to be higher in proportion than those of other trades. Furthermore, is not the public health and weal in our hands? If our work is not well done what is the result? The result is we kill the people. Then, I say, if we must maintain good mechanics to do the work we should have a fair remuneration for our services.

The immense strides which have been taken in the plumbing art itself of late years is best indicated, perhaps, by the numerous improvements that have been made in the materials used, and in the way of their manufacture and appliance. Where, for instance, are the old hand-made traps, offsets and bends of a few years ago? Indeed, there is scarcely any article in use that we cannot now buy cheaper and better than we can make it. I do not suppose that there is a master plumber in Chicago who would think to-day of putting any of his men to making traps. From experience and observation we have all seen the defects of the hand-made article and are willing to set it aside as a relic of the past. Too often have we had to take them out split open along, or near, the seam. I am told that in some parts of the old country plumbers still make them and put them in, thinking, I suppose, like Demetrius of old, that they are in danger of losing their business. Speaking for the plumbers of Chicago, I think I can say truthfully that we believe in adopting and putting in use the very best and most improved materials we can find, no matter what may be their cost. We believe in good workmanship; and in the latter we certainly equal, nay, excel, any other city and any other country in the world; and, in my experience of many years in the business I do not know that I have ever seen better workmen than we have at present. In a recent issue of a New York paper the comparison was drawn by a writer between the English and Chicago plumber in regard to the matter of wages, showing that the advantage was on the side of the Chicago plumber, so far as the figures are concerned. I think the comparison was correct; but I believe the work done in a day by a workman in Chicago (and I do not exaggerate) equals that done in a day and a half by the workman either in England, Ireland or Scotland—and what applies to the journeyman applies equally



F. J. ZIMMERLY, Ft. Wayne, Ind.

to the master; so that the question may be raised, Do we, indeed, on this side of the water, receive more money for our labor than is received by our English brother? What I have stated are facts, as I was myself an eye-witness only a few years ago; and the statements are corroborated by another of our members, who has recently visited those places, and also by one of my own menwho has gone back to the old country, never to return, because, he says, we are always in a hurry here; all it is is eat, sleep and work, and no pleasure.

One of the great evils growing out of this dreadful hurry is the desire—and it is a legitimate desire—to get work and get all we can. This is found true in all trades, especially that of carpenters. Not long ago I had some new buildings in which to do the plumbing and gas-fitting, and one week before the roofs were on the buildings the carpenters were laying the floors. What time was given the plumber and gas-fitter to put in his pipes and prove them? None. If you ask the carpenter to leave even one board loose in laying the floors the answer is: "I have no time; you ought to have put in your pipes before this; no provision having been made for lead pipes, put them in as best you can." In a few weeks the house is plastered, and before the putty coat is on the carpenter sublets the trimming of each building to separate contractors, and in less than one week, and before the windows or doors are

in place the painters are ready to do their work and waiting on the plumber. They will leave no boards loose; they will do no cutting of joists or floors; and if you ask them to put up boards on the walls on which to fasten the pipes, or even to set up sinks, the answer is: "I will if you will pay for them." I ask, who can do good work with such hindrances in his way? If the plumbing is bad, who is to blame? These are a few of the evils we have to contend with at the present time. Years ago all the cutting was done for us, and when we asked.

But to return to the matter of improvements: Only a few years ago lead soil-pipe was used exclusively; now, we use iron, the reason for the change being that the latter is proof against rats and against the nails of the carpenter, and because it was difficult to support lead. Expansion and contraction, corrosion and strain from the settling of the building would split it open. Cast-iron pipe I believe to be better, but it ought to be somewhat thicker than that which we have been using.

It ought to be added that one thing which is very much needed in Chicago is a system of public water-closets and urinals. I have been repeatedly asked on the streets by strangers where they could find such conveniences. Of course Rome was not built in a day, but the time has more than come when our city should be amply furnished with these accommodations, they should be well distributed and should be under charge of a keeper, responsible for their care.

W. W. Wilcox, Indianapolis, Ind.

Other improvements in the work might be dwelt upon, but they are too numerous to notice in the present essay. I may be pardoned, however, if I mention one little article in the form of a tool which, perhaps, every plumber among us now uses. Previous to 1867, as near as I can remember, in laying water-service pipes in the street from main pipes to curb, we had to dig across and between the car-tracks, causing much inconvenienve to the public and expense to the car company. Sixteen years ago Mr. Verity and myself had some contracts from the city to lay water service pipes in the street for every empty lot, laying the pipe under the area walls. We were nearly compelled to

Byron Hattersley, Ft. Wayne, Ind.

abandon the contract on account of water in the area walls but by using an auger we drilled under the wall at least twelve feet and put in our lead pipe; now, the auger has become an indispensable article to the trade. It may have been used previous to this time, but we had not seen it.

Another thing that I will mention which may be of some value, some of you may possibly have seen or done. During the summer you are aware that the city water does not rise in some parts of the day to the higher stories of our buildings; and in factories where they need water every hour of the day, it is a great inconvenience as well as an expense to carry it. On this account, you also know it is necessary to put up a tank on the top floor to catch water during the night. My device is automatic. Previous to its construction I had never seen anything that would do the work. The arrangement is this: We will suppose that there are a water-closet, sink and urinal on each floor, —say two or three floors. During the night the tank fills by a ball cock attached to the same pipe which supplies the various fixtures on each floor. In this way the water flows back from the tank into the same supply-pipe. I then tap the bottom of the tank, and connect it with the tank supply-pipe, putting in between the tank and the point of connection a check-valve. When the pressure of the water from the city main is greater than the pressure from the tank, the check-valve closes and the tank fills by the ball cock, and vice versa. On the other hand when the pressure of the tank is greater than the city pressure the water descends and supplies the fixtures. Finally, in order to prevent the water from passing back into the main pipe, or to the lower floor, I put in another check-valve, just above the point to which the city pressure rises during the day.

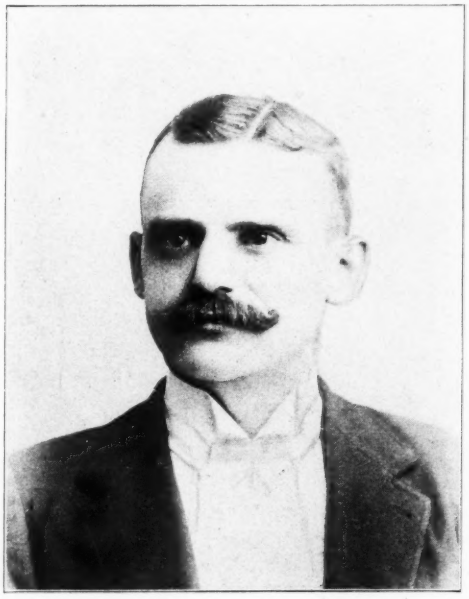
I have already made this essay much longer than I designed. In conclusion, let me add that, while in the past, and particularly in the last few years, there has been a marked advance in the art which we delight to call our own; while, indeed, its progress has been equal to that in any other department of mechanical or scientific enterprise; while, in a word, it has kept pace with the nineteenth century; and we must admit we are much indebted to Domestic Engineering and the men who, by their superior advantages, have demonstrated to us many things in relation to our business which it would have been almost impossible for us to have known; yet let us remember that here, as everywhere else, there are heights beyond, and to the scaling of these let us ever be devoting our best and noblest energies. We are followers of a worthy calling. Let no man, then, in these days be ashamed to have it known that he is a plumber. His is a trade which requires not only the cunning of the hand, but the skill of the intellect; and if in the years that are to come we shall see still more marvelous advancement it will be because there has been with you and with those who follow us not only sweat of the face but sweat of the brain.

The Physician and the Plumber.

By Dr. Oscar De Wolf, former Health Commissioner of Chicago.

THE term medicine conjures up to the mind of one who is not a physician, many curious images. It suggests to him his youthful days when surreptitious indulgence in a diet of green apples was followed by the infliction of a nauseous dose recommended as peculiarly palatable. Doses and medicine are in consequence in many minds synonyms. The jokes leveled at medical men turn upon the administration of medicine, and alliance with the undertaker. Dickens, usually partial to physicians, for example, says of Jobling the surgeon, and Mould the undertaker: "It was a great point with Mr. Mould, and a part of his professional tact, not to seem to know the doctor, though in reality, they were near neighbors, and often, as in the present instance, worked together. So he advanced to fit on his black kid gloves as if he had never seen him in his life; while the doctor on his part looked as distant and unconscious as if he had heard and read of undertakers, and had passed their shops but had never been brought before into communication with one." Such ideas and such pleasantry have in some measure conduced to the not peculiarly ennobling views held by many persons concerning the office of medicine; a view held in defiance of their welfare and of common sense.

The man who would grumble at being told by his physician to abstain from an over indulgence in food or alcohol, or, being informed that his ailment comes from a defective soil-pipe in his house, would growl at the rapacity of plumbers whom he must employ to repair it, would not object to paying for gallons of patent medicine nor refuse to take prescriptions in unlimited quantity. Medicine, like religion, in many minds trenches on the unknowable and is therefore a fair subject of theory. Volunteer medical advice, like a motion to adjourn, seems to be always in order. In the minds of the majority of people the province of the physician is limited to the use of drugs and the treatment of disease, and too many men professing to practice medicine, entertain the same idea and profit by its results. To conceive of medicine simply as the art of giving drugs leads to a degrading conception of medicine as a trade in human suffering. There is a homely adage containing the crystallized experience of many years of suffering and consequent reflection, which says, "an ounce of prevention is better than a pound of cure," and on the



J. C. JAHN, Ft. Wayne, Ind.

principle so roughly yet succinctly set forth is based what is known as state medicine. What is state medicine? As regards the diminution of human suffering it has been and is destined to be the most fruitful branch of medical science. Everything which prevents human suffering and increases the duration of human life comes under its purview. The causes of disease and the means of destroying these causes; the influences which aid and stimulate the progress of disease and the means of modifying or removing them; the agencies which lower human vitality and the means of increasing this vitality; the means of securing food of good quality and free from adulterations; the erection of dwellings in such a manner as to secure for their inmates fresh and wholesome air, pure water and the proper means of disposing of waste products cast off from

their bodies; these and many of the allied matters which bear upon them are the subjects of the state physician's care. He is therefore forced to call to his assistance not only all the resources of medicine, but the aid of the chemist (of the lawyer, of the architect, and of the practicer of your own art.

W. J. Freaney, of Indianapolis, Ind.

He has to meet the opposition of the avaricious landlord, of the ignorant tenant, of that large number of people to whom change is repugnant, and of such men in the practice of medicine as regard their professional labor from the mercenary standpoint alone

It may be asked, "What has state medicine accomplished for the world thus far? In former times men lived longer than they do now." Oh! this is a grave popular error; the one man who lived to be old is remembered; the hundreds who died before their fifth year are forgotten. The golden age of health cannot be placed in the past periods "where men died faster in the purest country air than they now do in the most pestilential lanes of quiet cities, and where men died faster in these lanes than they now die on the coast of Guinea."

What has state medicine done for the world? Mr. Chadwick answers, "By modern sanitary work covering the sites of cities and large towns, their proper drainage and sanitary policing, their water and food supply, and by the active sanitary supervision of the work-shops and homes of all classes, we have gained the power of reducing the sickness and death-rate in our larger cities by at least one-third."

Amongst the most important questions with which the state physician has to do is the proper construction of conduits through and from dwellings. Here the physician and the plumber meet, and they should alike be actuated and controlled by sentiments of honor and enlightened professional duty.

Like the physician, the plumber is made the butt of many witticisms. His enormous bills, his rapidly growing wealth, and his proposed trip to Europe furnish the newspapers with themes which amuse their readers at the expense of your guild.

In my opinion the responsibilities resting upon you are greater than those resting upon any other class of skilled handicraft. You may be the means by which the most atrocious diseases are directly introduced into a household, or through your instrumentality the vitality of the inmates may be slowly sapped out and the soil prepared in which destructive agencies will flourish like the Upas tree. On the other hand your skillful services may do more to restore health to such a family or community than all the drugs to be found in the pharmacopæia. You cannot therefore put aside the fact that the practice of your art is something more than a mere matter of dollars and cents; a return of so much money for so much labor and so much capital, but it involves human life protected or jeopardized, human suffering and woe diminished or augmented. I leave the question with you, has this responsibility always been recognized?

Dr. Vallin, editor of the Revue d' Hygiene, says "Plumbing in the English speaking countries is passing from among the trades and taking its place in the industrial arts." I believe this is true, and I congratulate this city, I rejoice myself, that this sentiment has so actively impressed the thoughtful minds of the calling in our midst

D. A. Westbury, of South Bend, Ind.

that the master plumbers' association of Chicago exists, and in my judgment is to exert an influence in the next five years which is to-day hardly contemplated. Your association is a testimony to the fact that you recognize the change that this progressive age is stamping upon your calling and of your desire to take it from the ranks of trade and place it among the industrial arts. It is a legitimate and enlightened desire, but while it adds dignity to the calling it brings increased responsibility, and these responsibilities it is the duty of your association to meet.

You will infer that after years of service in one way or another, near or remote, devoted to sanitary study and labor, I have come to entertain some crystallized notions regarding the personnel of the plumbers' trade as it is called, and of the measures necessary for its advancement to the position you desire it should occupy. In discussing the questions suggested by this remark I shall be sure of your courteous attention even if I fail to receive your assent.

Wm. B. Griffin, Waterloo, Ia.

I recognize three classes of plumbers,—(1) The skilled artisan, honorable, intelligent, reliable. (2) The men who may be designated as "botches"; men who, because they have learned how to use a soldering iron, call themselves plumbers; men, who not only injure the reputation of honest work and honest workmen, and imperil the health of communities, but also increase the popular rage for the "cheap" in place of increasing the demand for the "good." Men who diminish the remuneration which conscientious and thoughtful workmen should receive—and must receive by teaching the public that plumbing which is cheap answers all purposes. (3) The so-called "practical men," who as Hellyer says, "having learned the plumber's trade in their youth have learned nothing since, and are totally unconscious of the fact that plumbing like the other arts has advanced with the general advance of science." This class act in a similar, though at first sight seemingly less injurious, manner as the "botches." That they do as much, if not more harm, than the botches, to the reputation of the plumbing art cannot be denied. Their work is done, from a purely mechanical standpoint, better than his, their blunders are not so soon detected, but they do more to confirm the public in a taste for the cheap in place of educating it into an appreciation of the good.

A so-called practical plumber is generally like other self-called practical individuals the most impracticable of human beings. Improvements not fitting in with theories which, being moss grown and ancient, have in his opinion become transmuted into facts, are objected to and sneered at because they interfere with his ideal (to-wit) work as good from a mechanical standpoint as is consistent with cheapness.

Now, how much harm is constantly done to the reputation of honest, progressive and able plumbers by the work of these two classes cannot well be estimated. It is not the snide workman, the botch, the cheat who alone suffers by the work he does. If it were so, the dishonest might be cast out and that would be the end of the matter; but it is not so; to the public a plumber is a plumber, and when a botch putties up a joint in the soil-pipe which by and by breaks away, floods the house with emanations from the sewer, and, as a result, a child of the household lies dead with diphtheria, the father will not confine his denunciation to the scamp who did the work, but damns the whole craft.

Macaulay says "bad men suffer first from laws which are afterwards perverted to oppress the innocent," and so, when the health commissioner finds himself obliged to prosecute a snide plumber for designedly making bad joints in his work, the guilty man is punished with fine, but the whole guild suffers by an unreasonable thoughtless public sentiment which carries along the crime of one into the honest work of the other and thus the personal honor and reputation of the innocent are soiled. Now, what is the position this association should assume to secure its highest usefulness, protect the public against fraud and thus conserve the general health?

Edward Harrigan, of Detroit, Mich.
President of the Michigan Master Plumbers Association.

To my mind state medicine may step in here to your aid

The art of the plumber, like the art of the apothecary, should be conducted according to certain requirements established by law.

The first means which naturally occur to the Amerian mind are to inflict penalties for violation, but the infliction of penalties alone will not remedy great evils; more must be done, and that something which has been most strongly urged is the American panacea for all social evils—educa-

tion. Dr. Cormall says, educate the plumber so that he shall have a thorough knowledge of his business and require of him before he is allowed to undertake the execution of any work, to have a license from a competent and honest board of examiners and register his name and place of business before the proper authorities.

Hellyer recommends the establishment of a school in which the art shall be taught, and that the apprentice who has pursued a full course shall receive a diploma stating the grade and standing of the person who receives it. That there should be a more thorough education of the plumber in his art no reflecting mind will feel inclined to deny, but that Hellyer's suggestion is the best that can be thought of will be very naturally questioned. If the honest and able practitioners of plumbing are disgraced and degraded by botches and "practical men," they are also much annoyed by the honest apostles of change, whose zeal carries them beyond their knowledge and who are wafted about by favorite theories and impracticable ideas. This class—honest men as they are—would be largely increased by a school system of education, for such a system always tends to add to the numbers of such as can only see half of a truth at a time, and men of half truths are dangerous and disturbing elements anywhere.

A much better plan to my mind would be the revival of the old system of apprenticeship with its successive stages of apprentice, journeyman, and master, clearly defined and subject at each stage to state supervision and control by a body chosen (like the board of pharmacy, from the members of their association) from the master plumbers' association of the state.

It may be said that this plan is impracticable, and that trades unions would cry out against it. Impracticable it certainly is not, and trades unions should not object, because it would diminish the number engaged in the work by weeding out and driving away incapables. Such a system would elevate the tone and give the public confidence in your art. That such a system would reform everything from the outset of its adoption, it would be absurd to claim; but that the evils of the present system would rapidly and progressively diminish there is not the slightest shadow of a doubt. I have taken up this topic so intimately related to the progress of your art because it is one of peculiar interest to me as a sanitary officer from every conceivable standpoint. The regulation in some manner of the plumbers of Chicago by law is only a matter of time, and short at that. This regulation has already been completed in New York state, and the plumbers of New York city and Brooklyn have been placed, it must be confessed somewhat hastily, under the control of the city department of health. This procedure has been criticised, not entirely without reason, but with too much acerbity by many honest and undeniably able plumbers sincerely desirous of elevating the tone of their art, as not calculated to accomplish the object aimed at.

CHAS. B. HUCK, of Buffalo, N. Y., President N. Y. M. P. A.

It seems to me that a movement which would anticipate all hasty legislation of the kind to which allusion has been made might, with great propriety, be inaugurated by this association. Your interests as individuals, as well as skilled mechanics, are deeply involved. Everything which enhances the prosperity of the communities in which you dwell and labor increases your prosperity. Legislation based upon the plan so briefly sketched would please every plumber, and gratify every student of state medicine.

The Sewerage of Nahant, Massachusetts.

By E. W. Bowditch, C. E.

THE town of Nahant was considerably disturbed during the latter half of 1881, and the first half of 1882, by the appearance of typhoid fever in various parts of the town.

The questions then presented for solution were:—1. What was the cause of disease? 2. What should be the remedy? 3. How long would it take to give relief? 4. What would it cost?

The disease being zymotic, the remedies suggested were largely those that would be prescribed by a board of health—cleaning of premises, securing better drainage, plumbing, etc., and removal of all decomposing matters; afterwards trying to better the quality of water, ice, milk, etc.

Without going into details that would prove but repetitions of what may be already fairly well known, the writer desires to call attention in as few words as possible to those portions of the work that may not be so well understood; viz., separate sewerage, and the apparent recovery of the soil after pollution.

The former of these two subjects is better understood, perhaps, than the latter, although still imperfectly known in this country.

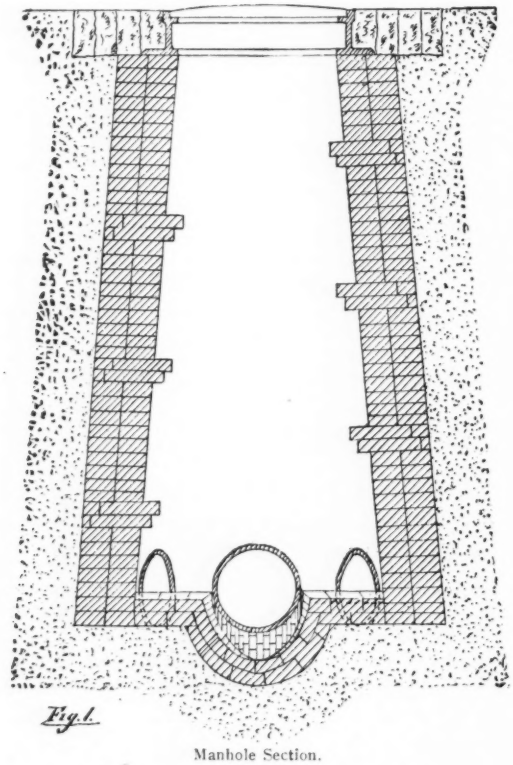
It being determined to construct a system of sewers, the "separate" system was adopted, as less expensive and

quicker to build. It was argued that if manholes were placed at all junctions, and changes of direction, whether vertical or horizontal, it would be comparatively easy to flush with water, or clean with rods, chains, brushes, etc. (See Figures 1 and 2.)

On questions relating not only to the preliminary selection of materials, but actual constructive work and maintenance, the writer borrowed freely on all sides, and though usually the methods heretofore employed by other engineers answered the purpose at Nahant, occasionally slight modifications and additions were made that seemed desirable.

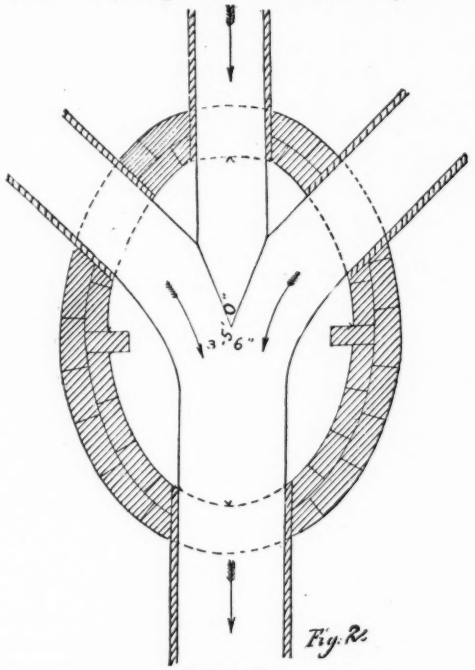
Particularly was this the case with the apparatus for cleaning the sewers, and in the arrangement for the ventilation both of sewers and private drains.

The requisite capacities for sewers were figured on a basis of the area to be served, the proposed grade for each pipe, the velocity of flow of sewage, in every case, and the quantity of sewage that might be delivered at given points during those hours when plumbing would be in greatest use (between 8 and 10 a. m). The sizes of pipes, thus determined by calculation, were doubled, so that when in maximum use they would run one-half full. Although many of the lateral sewers, figured on this basis and doubled, should have been four-inch pipes and not larger, the difficulty experienced in obtaining sufficient quantities of pipe of that size, straight enough to admit of inspection between manholes placed 250 feet apart, was so great, that six-inch pipe was selected as the minimum size.



Manhole Section.

Actually constructed, the sewers vary in size from six inches to eighteen inches in diameter, and are, so far as possible, laid with tight joints, excluding all ground and surface water. At the present time, the only water purposely admitted to any of the pipes, other than house sewage, is the rainfall from the roof of one schoolhouse, that covers an area of 1,300 square feet. This was connected, as that part of the sewer was what is termed a "dead end," and received the sewage from one house only.



Manhole Plan.

It is believed that the pipe system at Nahant can be pointed to as the only system of separate sewers that are operated without public water of any description, and that in certain sections have only a very limited supply of even well and cistern water. From their method of construction, however, as has been shown, every portion of the system is capable of being, and actually is, inspected periodically. Every length of pipe can be examined and cleaned. not only by flushing, but by scrubbing with wire brushes.

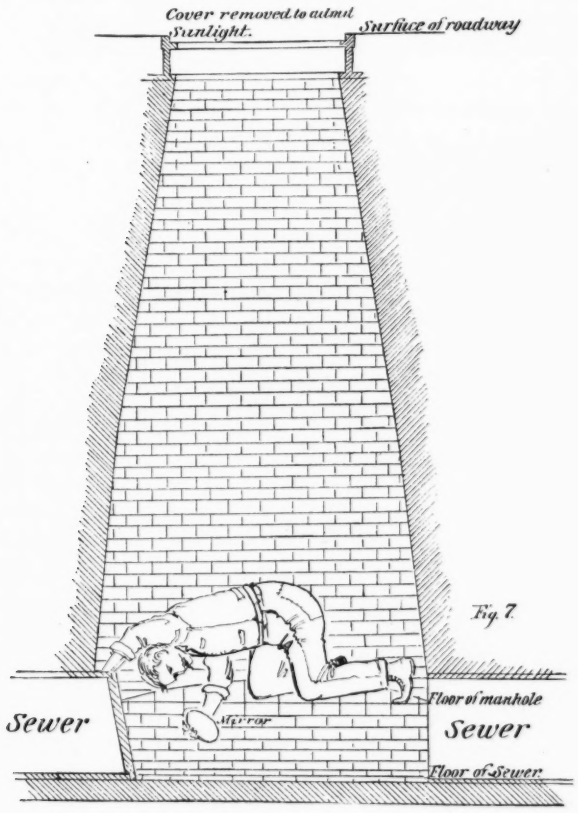
When it is desired to flush any line of pipe, a sand bag is used as a plug for the outlet of a manhole, which is then filled with salt water by the town water cart—rather a primitive fashion of procedure, but one that it was decided to adopt, temporarily, during the first season, or until it should be demonstrated by actual experiment where flush tanks should be located and what their size should be. As a rule, water enough is put into the manhole in question to make a solid water plug, as it were, for forty feet of the sewer, below the manhole.

The flushing by this crude method has been so successful, and has to be attended to so seldom, that it is quite possible the special flush tanks may be omitted entirely.

During construction, silt, in the form of fine sand and clay, found its way into some of the pipes, and upon completion of the work deposits were found in certain sections; in one case to a depth of over three inches, and very compact. The question of removal seemed quite a serious one; the more so, after repeated flushings had failed to cary off the obstruction.

After repeated experiment one of the two leading courses was adopted in every case: a shingle with a lighted candle fastened upon it was allowed to float down the pipe from a manhole, being controlled from the initial point by a string, so that it could be stopped when desired. An obstruction met could be located by measuring the length of the string. This being ascertained, a hoe or rake was introduced on one end of a series of jointed rods (which when screwed together somewhat resemble a fishing pole), and the sand loosened and afterwards flushed off with water; or, a stout twine was attached to a wooden plug, which was floated down from one manhole to another, and to which, in turn, was fastened a small rope and a section of rather heavy iron chain, which latter could be dragged to and fro, until the whole mass of sediment was loosened.

These appliances, except the shingle and candle, are the ones ordinarily in use for pipe sewers, and were found tolerably satisfactory, though not wholly so. To meet the want still felt circular brushes of various sizes that could be attached to a rope or a rod and then pulled or pushed through were devised; at first these were made of stiff

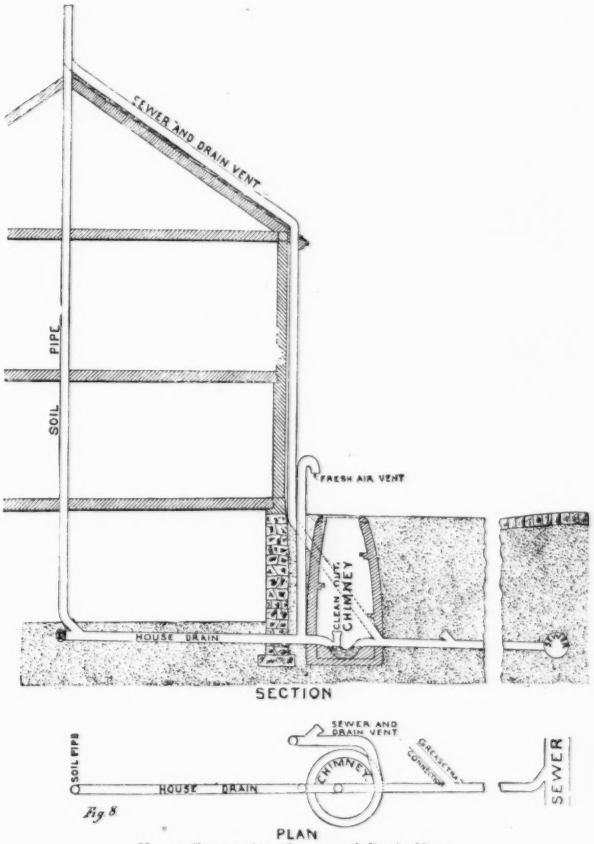


Section of Manhole.—Showing Method of Inspection with Mirror.

bristles, but now are constructed of flat steel wires, fastened to a wooden core, and with the arrangements before mentioned appear to be sufficient for all purposes. After being once thoroughly cleaned the question of keeping the sewers in that condition was much simplified.

Inspection now consists either in reflecting the sunlight through the sewer, from one manhole to another (see Fig. 7), which enables a very fair inspection without any flush whatever, or in the use of the shingle and candle before mentioned. If any foreign matter appears to be in the pipe, its position can be located (if the day be sunny) by counting the joints in the pipe, which can be seen by the mirrors above referred to, and the brush, chain, hoe or rake used, as may seem best.

The system, which is today nearly five miles in length, is intended to be thoroughly ventilated, and includes not only the public sewers, but all private drains below running traps.



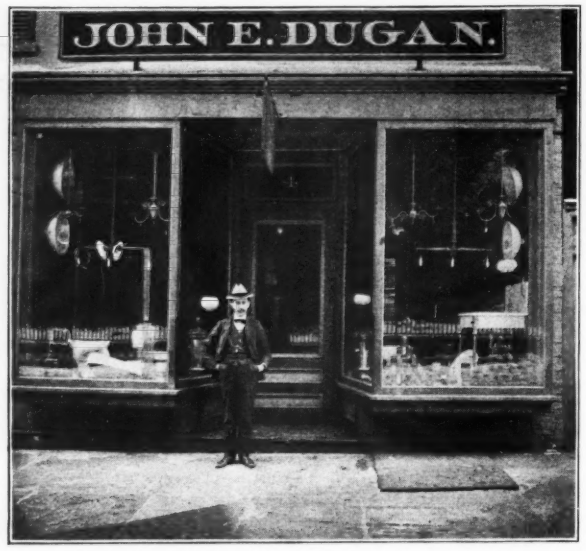
House Connection, Sewer and Drain Vent.

The lower manhole on each trunk sewer is provided with a perforated cover, to relieve the other portions of the sewer from the pressure caused by heavy surf, and not, as has been suggested, as a fresh-air inlet, for, on the upper side of each manhole is a flap valve or tide gate which would effectually prevent any such use being made of the perforated cover. The sewers and house connections above the last manhole on each trunk line (which manhole is intended for the purpose above described) are water-tight, so far as careful work can make them. House connections are entered in 4-inch Y pipes, and the ventilation for both sewer and house drain is provided for by a 4-inch pipe, connecting outside each and every house, extending from the main drain of each building just below the running trap, to some point above the chimneys. (See Fig. 8.) This provides not only for the ventilation of sewer and house drain (the latter is rarely ventilated between the running trap and the sewer, though apt to be fouler than any

portion of the public sewer), but it also causes each house drain to ventilate its proportion of the system, and prevents the usual concentration of the gases at a few points.

All ventilation being above the top of the house, there is very small chance of annoyance from smell, and so far as known there has been none noticed at any point save slightly at the perforated manholes at the foot of the trunk lines, and in three instances from "puffing" of fresh air inlets to house drains—both of which were disconnected from the sewer and drain ventilation referred to.

Many of the houses at Nahant being provided with privies instead of water closets—and privies, too, of the poorest possible type—a style of earth privy was adopted, as being

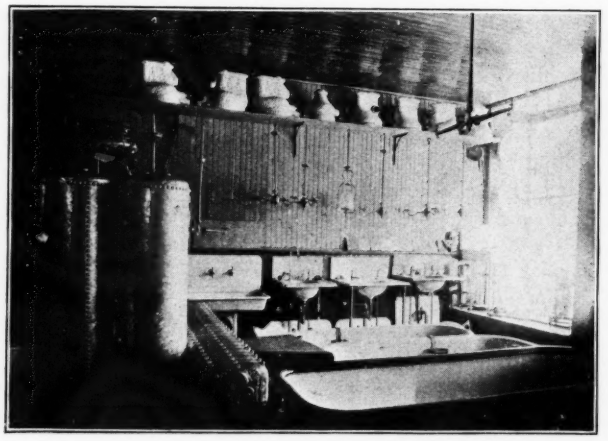


John E. Dugan, of Albany, N. Y., and several views of his handsome plumbing store.

perhaps more easily attended to than any other, and at the same time capable of being used, but not abused.

Any privy whose contents are received in a leaking vault, is undesirable, and when such vault is, as is not uncommonly the case, used as general slop-hopper as well, and the soil in the immediate neighborhood drenched periodically with the family filth, it should always be viewed with distrust.

At such points as seemed permissible the option was given between the tub set on the slanting asphalt floor, or a thoroughly cemented shallow vault into which no slops were to be thrown.



The foregoing rather brief description with the accompanying plates may be sufficient to show what was done at Nahant, to prevent further soil pollution. In addition to this, and at the same time, an investigation was constantly going on, to ascertain the amount of both soil and water pollution already existing, the general condition of individual premises, inside and out, with a view to determining what remedial measures should be applied, how and when.

A slight knowledge of the local geology of the peninsula may be of service in this connection.

The soil at Nahant varies in character much more than is generally supposed. Portions of the town show solid rock outcroppings; near by are deposits of fine white sand, fifty feet deep, or loose running gravel (drift) from twelve to thirty-five feet deep, and overlaying the ledge, which still shows distinctly the grooves and markings of former glacial action. A little further on is found stiff bluish brick clay from twenty to sixty feet in depth, while the town

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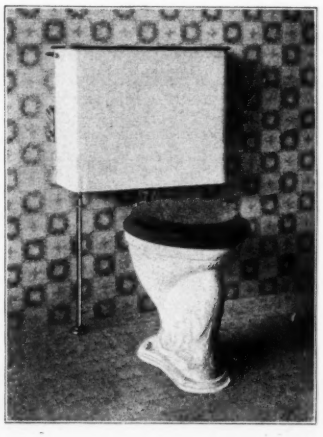
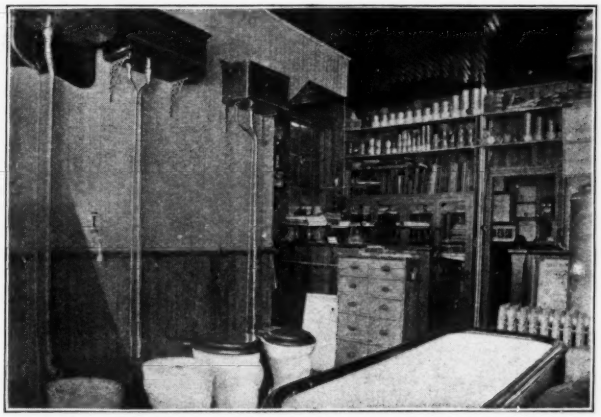
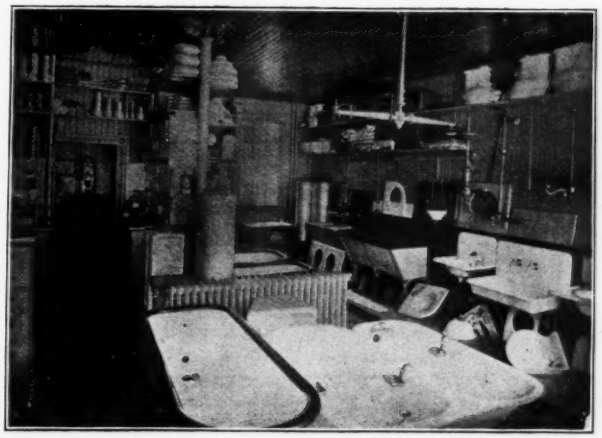


gravel pit at the west end exhibits a face of binding gravel of unusually good quality.

It being impossible to introduce public water on such short notice, the effort was made to remove all known sources of contamination, abolishing all cesspools and leaching vaults, draining marshes that smelled offensively, and, after removing all causes of filth, to pump out and



cleanse all wells and cisterns that afforded chemical or physical evidence of being tainted. There being hundreds of wells and cisterns used as drinking and cooking supplies, hundreds of chemical analyses were made, in the first instance to determine the general character of the water, and afterwards to ascertain what effect, if any, was



produced (after removal of the supposed sources of trouble) by the pumping out and cleaning.

In many instances there was little or no improvement in the quality of the water, in others it was appreciably benefited, and occasionally, so far as could be ascertained chemically, waters were rendered entirely satisfactory, that were previously classed as decidedly injurious.

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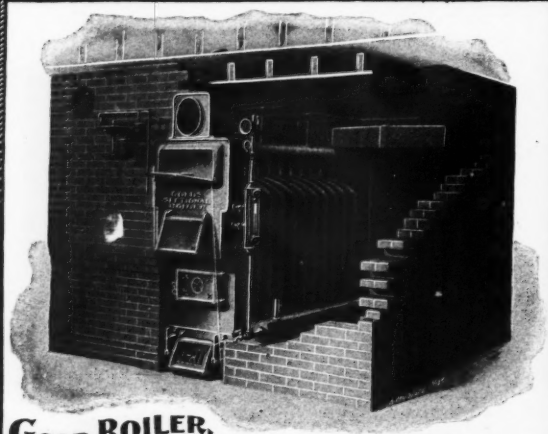

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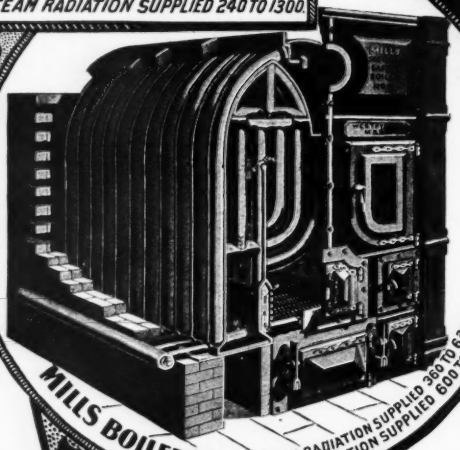

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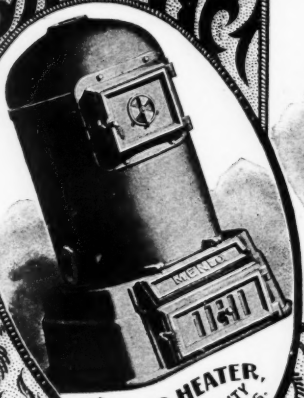

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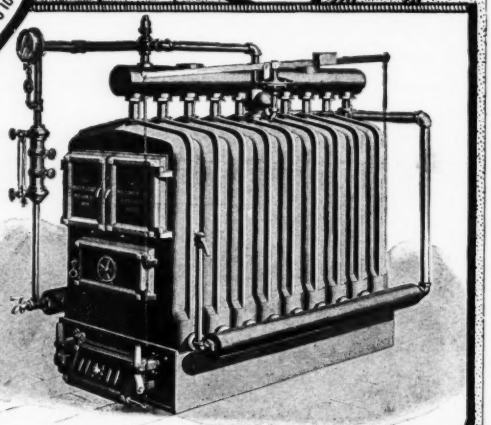

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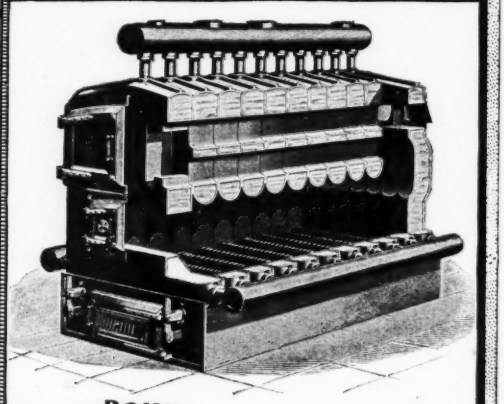

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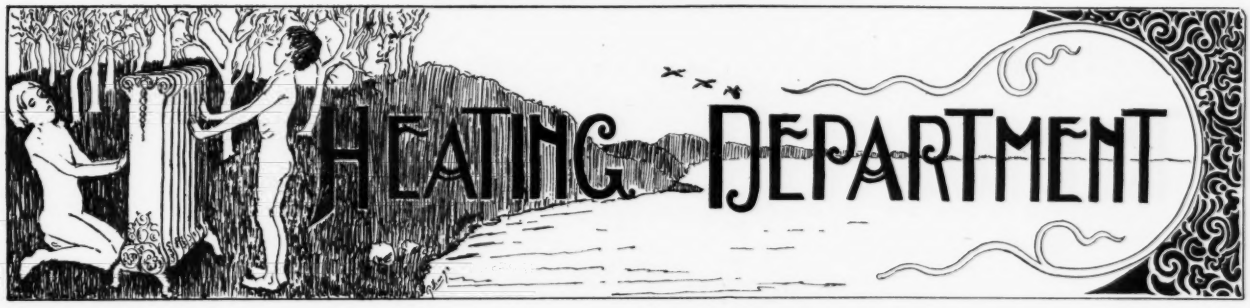

Heating and Ventilation.

A Course of Lectures which, when completed, will cover the theory and practice of those arts.

By Chas. L. Hubbard, of Boston, Mass.

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ANY system of warming must include, first, the combustion of fuel which may take place in a fireplace, stove, steam or hot-water boiler; second, a system of transmission, by means of which the heat may be carried, with as little loss as possible, to the place where it is to be used for warming, and third, a system of diffusion, which will convey the heat to the air in a room and to its walls, floors, etc., in the most economical way.

Stoves. The simplest and cheapest form of heating is the stove. The heat is diffused by radiation and convection directly to the objects and air in the room, and no special system of transmission is required. The stove is used largely in the country and is especially adapted to the warming of small dwelling houses and isolated rooms.

Furnaces. Next in cost of installation and simplicity of operation is the hot-air furnace. In this method, the air is drawn over heated surfaces and then transmitted through pipes, while at a high temperature, to the rooms where heat is required. Furnaces are used largely for warming dwelling houses, also churches, halls and schoolhouses of small size. They are more costly than stoves, but have several advantages over that form of heating. They require less care, a number of rooms may be warmed from a single

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furnace, and, being placed in the basement, all dust from coal and ashes is kept from the rooms above.

In construction a furnace is a large stove with a combustion chamber of ample size over the fire; the whole being enclosed in a casing of sheet iron or brick. The bottom of the casing is provided with a cold-air inlet, and at the top are pipes which connect with registers placed in the various rooms to be heated. Cold fresh air is brought from out of doors through a pipe or duct called the "cold-air box;" this air enters the space between the casing and the furnace near the bottom and in passing over the hot surfaces of the fire pot and combustion chamber becomes heated. It then rises through the warm air pipes at the top of the casing and is discharged through the registers in the rooms above.

As the warm air is taken from the top of the furnace cold air flows in through the cold-air box to take its place. The air for heating the rooms does not enter the combustion chamber. Fig. 1 shows the general arrangement of a furnace with its connecting pipes. The cold-air inlet is seen at the bottom and the hot-air pipes at the top; these are all provided with dampers for shutting off or regulating the amount of air flowing through them. The feed or fire door is shown at the front and the ash door beneath it; a water pan is placed inside the casing and furnishes moisture to the warm air before passing into the rooms; water is either poured into the pan through an opening in the front, provided for this purpose, or is supplied automatically through a pipe.

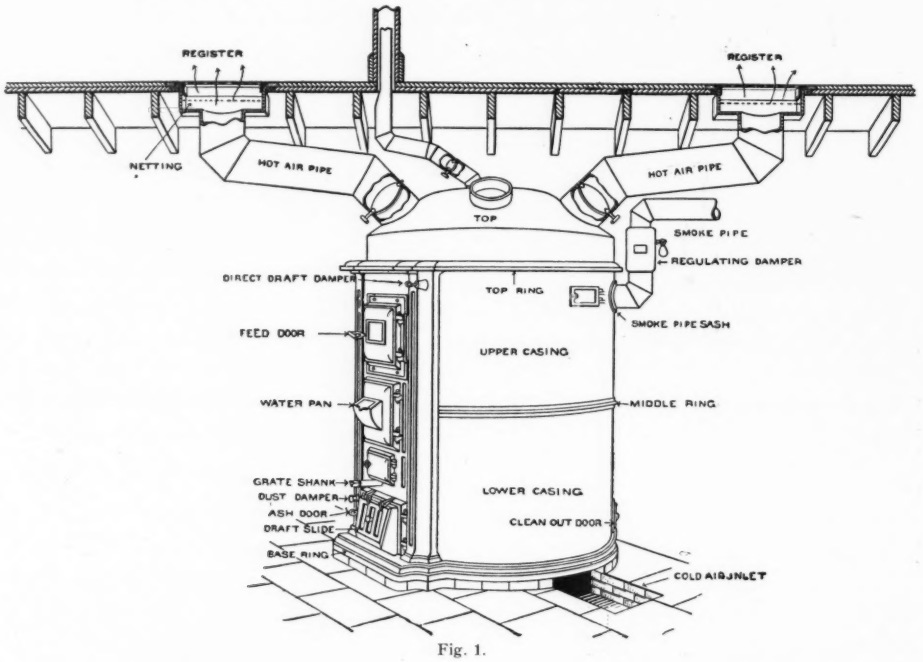


Fig. 1.

Fig. 2.

The fire is regulated by means of a draft slide in the ash door and a cold-air or regulating damper placed in the smoke-pipe. Clean-out doors are placed at different points in the casing for the removal of ashes and soot. Furnaces are made either of cast-iron or of wrought-iron plates riveted together and provided with brick-lined fire pots.

Fig. 3.

One great advantage in this method of warming comes from the constant supply of fresh air which is required to bring the heat into the rooms. While this is greatly to be desired from a sanitary standpoint, it requires a larger amount of fuel than would otherwise be necessary, for heat is required to warm the fresh air from out of doors up to the temperature of the rooms, in addition to that lost by leakage through walls and windows.

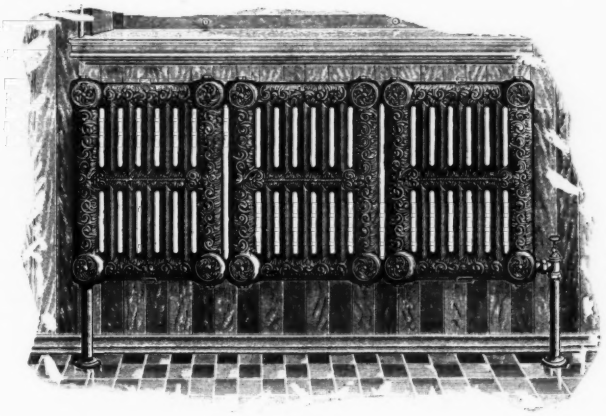


Fig. 4.

A more even temperature may be maintained in this way than by the use of stoves, owing to the greater depth and size of the fire, which causes it to be more easily controlled. When a building is placed in an exposed location, difficulty may be experienced at times in warming certain rooms, depending upon the direction of the wind; this may be overcome to a large extent by a proper location of the furnace and the exercise of suitable care in running the connecting pipes. This will be taken up later in the design of heating systems.

Fig. 5.

Direct Steam Heat.

Direct steam heating is used in all classes of buildings, both by itself and in combination with other systems. The first cost of installation is greater than for furnace heating, but the amount of fuel required is less, as no outside air-supply is necessary. If used for warming hospitals, schoolhouses or other buildings where ventilation is desired it must be supplemented by some other means for providing warm fresh air. A system of direct steam heating consists of a furnace and boiler for the combustion of fuel and the generation of steam; a system of pipes for conveying the steam to the radiators and for returning the water of condensation to the boiler, and radiators or coils placed in the rooms for diffusing the heat.

Various types of boilers are used, depending upon the size and kind of building to be warmed. Some form of

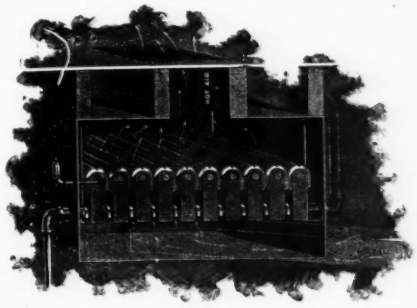


Fig. 6.

cast-iron sectional boiler is commonly used for dwelling houses, while the tubular or water tube boiler is more usually employed in larger buildings. Where the boiler is used for heating purposes only, a low steam pressure of

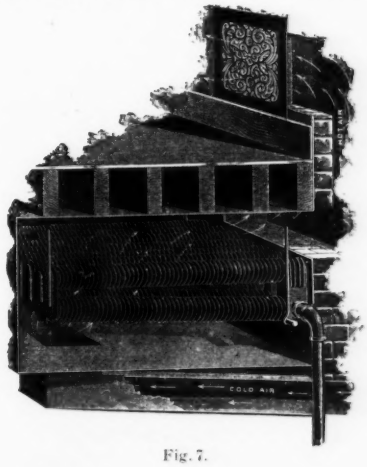


Fig. 7.

from 2 to 10 pounds is carried and the condensation flows back by gravity to the boiler which is placed below the lowest radiator. When, for any reason, a higher pressure is required, the steam for the heating system is made to

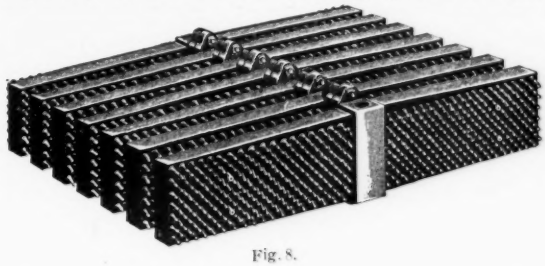
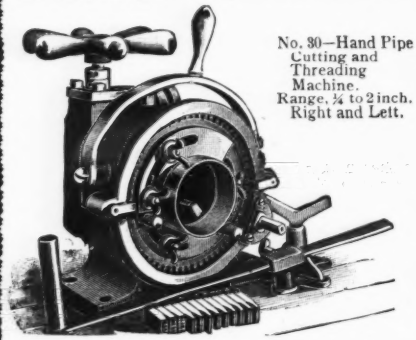


Fig. 8.

pass through a reducing valve and the condensation is returned to the boiler by means of a pump or return trap. The methods of making the pipe connections between the boiler and radiators vary for different conditions and in different systems of heating. These will be taken up later under the head of design. Direct radiating surface is made up in different ways: Fig. 2 shows a common form of cast-iron sectional radiator; these can be made up in any size depending upon the height and number of the sec-



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tions used. Fig. 3 is made up of vertical wrought-iron pipes screwed into a cast-iron base and is a very efficient form. Fig. 4 shows a form of cast-iron wall radiator which

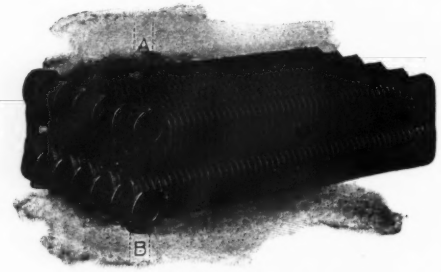


Fig. 9.

is often used where it is desired to keep the floor free from obstruction. Fig. 5 is a special form of dining-room radiator, provided with a warming closet. Wall and ceiling

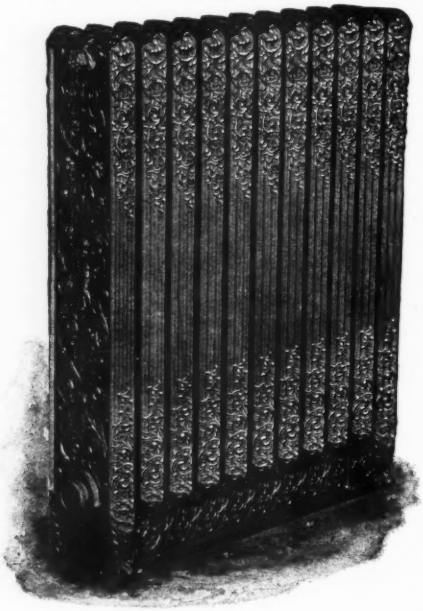


Fig. 10.

coils of wrought-iron pipe are often used in school rooms, halls and shops or where the appearance is not objectionable.

Indirect Steam.

This system of heating combines the advantages of both the furnace and direct steam but is more expensive to install. The amount of fuel required is about the same as in the case of furnace heating. Instead of placing the radiators in the rooms a special form of heater is placed beneath the floor and encased in galvanized iron or brickwork. A cold-air box is connected with the space beneath the heater and warm-air pipes at the top, are connected with registers in the floors or walls as already described

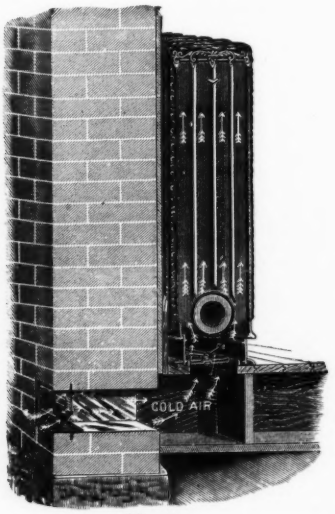


Fig. 11.

for furnaces. A separate heater may be provided for each register if the rooms are large, or two or more registers may be connected with the same heater if the horizontal runs of pipe are small. Fig. 6 shows a section through a heater arranged for introducing hot air into a room through a floor register, and Fig. 7 shows the same type of heater connected with a wall register. The cold-air box is seen at the bottom of the casing, and the air in passing through the spaces between the sections of the heater becomes warmed and rises to the rooms above.

Different forms of indirect heaters are shown in Figs. 8 and 9. Several sections connected in a single group are called a "Stack." Sometimes the stacks are encased in

brickwork built up from the basement floors instead of galvanized iron, as shown in the cuts. This method of heating provides fresh air for ventilation, and for this reason is especially adapted for schoolhouses, hospitals, churches, etc. As compared with furnace heating it has the advantage of being less affected by outside wind pressure, as long runs of horizontal pipe are avoided and the heaters can be placed near the base of the flues. In a large building where several furnaces would be required, a single boiler can be used and the number of stacks innecessary to run but a single fire. Another advantage is the large ratio between the heating and grate surface as compared with a furnace, and as a result a large quantity of air is warmed to a moderate temperature in place of a smaller quantity heated to a much higher temperature. This gives a more agreeable quality to the air than would otherwise be obtained. Direct and indirect systems are often combined, thus providing the living rooms with ventilation, while the hallways, corridors, etc., have only direct radiators for warming.

Direct-Indirect Radiators.

A direct-indirect radiator is similar in form to a direct radiator and is placed in a room in the same manner. Fig. 10 shows the general form of this type of radiator, and Fig. 11 shows a section through the same. The shape of the sections is such that when in place, small flues are formed between them. Air is admitted through an opening in the outside wall and in passing upward through these flues becomes heated before entering the room. A switch damper is placed in the duct at the base of the radiator so that the air may be taken from the room itself instead of from out of doors if so desired.

Some Notes on Central Station Heating.

Read by Wm. H. Bryan, Member of the Society, before the American Society of Heating and Ventilating Engineers.

A DECADE ago the electric lighting world was in the clutches of the "system" salesman. There was the arc light man, and the incandescent light man. The incandescent field was divided against itself as between direct and alternating currents. The man who put in an electric light plant in those days put in somebody's "system." The owner or the agent of the "system" took the entire contract—dynamos, switchboard, wiring, sockets, lamps, fixtures, meters, transformers, and everything. There was serious doubt as to whether one man's lamp would work at all with another man's dynamo.

No promoter of a system would admit for a moment that there was any merit in anybody else's system. His was the only one and only way to do it. The others were simply charlatans, thinking only of the purchaser's money, and sure to involve him in all kinds of difficulties, of which lawsuits on patent infringements were the least. Slight as was the purchaser's knowledge of electricity, it often happened that the seller knew but little more.

All this has changed. The generation and distribution of electrical energy have been reduced to an exact science. The advantages of each character of service have been clearly defined, and are universally recognized. Each has its field wherein it is supreme. The "system" has disappeared. The purchaser's engineer studies the problem, and determines the method of electrical generation and distribution which will best suit the conditions in hand. He writes specifications, and gets bids from half a dozen manufacturers. In the end he will quite likely get his dynamos from one firm, his converters from another, his lamps from another, his meters from another, and let the contract for the installation, including pole lines and distribution system, to still another. He has analyzed each maker's apparatus, and has reason for believing that the final plant will go together in ship-shape, and will give greater satisfaction than if purchased from any single manufacturer. Indeed, it is rare that one manufacturer makes the best of each of the individual units which enter into the construction of a modern electrical plant.

Central station heating seems to be in the throes of the "system" to-day. John Doe addresses a learned body upon his particular way of doing it. So elaborate is his system, and so fully has every detail been covered, that it seems to leave nothing to be desired. He admits, however, that it has been done in other ways, but they are not to be compared with his. Forthwith Richard Roe, who also has a "system," corrals a page or so of the technical press, to tell a waiting world that his is the one and only system. He, too, admits that others have done it differently, but in so doing they have only exposed their ignorance. Others shy their castors into the ring, and it is a merry squabble. John Smith has a way to do it, but he does not urge it upon the central electric station manager. He has reached the opinion that there is no help for the electric station man in exhaust heating, and he must work out his salvation in other ways. In his judgment the conditions under which the exhaust from central stations can be profitably used for heating are so rare that they may be dismissed from further consideration.

Now all this adds to the gaiety of nations, but it does not help the investor or the engineer who are hunting for the best thing. Each system can point to successful plants, but in every case success has been reached by a long series of expensive experiments. It cannot be said in this field—any more than in any other—that no mistakes have been made.

Now, it is not the purpose of this paper to decry or under-value either the systems or their promoters. They have done a good work and are entitled to their reward. They were the pioneers, and have borne the brunt of the battle. They have had a wide and varied experience, and know what to do—as well as what not to do, a qualification of even greater value. Nor is the benefit of a single responsibility for equipment and results to be underesti-

mated. But it would seem that the time is rapidly approaching when the installation of a complete "system" will be secondary to the intelligent design and selection of apparatus by unbiased experts of good technical training, supplemented by broad practical experience. They may be expected to attack this problem from the elevated standpoint of impartiality, selecting for their client whatever is good in any particular system, but leaving themselves free to purchase such portions—whether large or minor—from other builders where a particular detail is of higher merit.

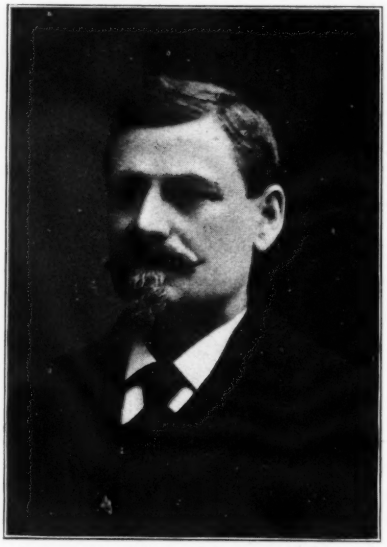
The success of the installations thus far made has in most cases been due to fortunate surroundings. Indeed, it is not to be denied that in many cases a system of entirely different character would have succeeded equally well. It is, nevertheless, true that each way of doing it has its advantages, and also its disadvantages. Sometimes the conditions are so unfavorable for central station heating that no system could succeed. In other cases the conditions are peculiar, and can be met by one system better than another. A system which scores an unqualified success in one city may fail and another succeed in a neighboring city where the conditions are different.

It is not too much to say that continued success hinges upon the proper selection of methods and means, and the detail design of the installation, coupled, of course, with intelligent and energetic business methods and technical judgment in the operation and management.

The above are the conclusions which resulted from a recent attempt to collect and digest the available literature and experience on the subject of central station heating. These investigations into the present state of the art had special reference to the use of exhaust steam from central electric plants. The lack of accurate and reliable data was surprising and disappointing. Much of the literature has been written from the standpoint of the promoter of a particular system, or by the user of a system who advocates it highly, but who, having had no experience with other systems, is not in a position to give an impartial verdict. There appears to be many faulty and misleading data at large. It seemed, therefore, that it might be of value to place on record some of the data collected—not with a view of presenting anything new or startling, but in the hope of bringing out additional facts, and of inviting discussion.

Heating from central plants is not new, although the subject has only recently begun to attract extended notice. Nevertheless, the outlook is one of great promise. It is, of course, only feasible in cities of some magnitude, where large commercial buildings or residences are concentrated, and so located as to be readily reached from a central station. This is usually on the outskirts of the business section, where fuel and water are readily secured, and where ample room for growth is available.

Many methods of central station heating have been employed, but they have now been reduced to practically two —steam and hot water. Experiments have been made with hot air, gas, and electricity, but without marked success. Hot air has been carried to limited distances where groups of buildings are situated together, but the size of ducts necessary makes this system prohibitive over any extended area. It is feasible in isolated buildings, in connection with coils served by either steam or hot water from a central station. Indirect heating of this character is common, but the successful distribution of hot air itself is necessarily confined to a single building or group. The manufacture and distribution and use of gas and electricity for heating are both attended with so much apparatus, and with such large unavoidable first costs and losses in efficiency, as to be out of consideration for any extended



M. W. MANWARING, BRIDGEPORT, CONN.
Second Vice President of the Connecticut State Association of Master Plumbers.

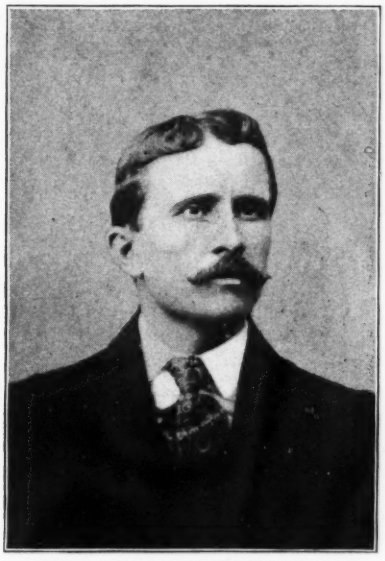
use. Both have—and will continue to have—some limited application for peculiar and special purposes, but neither is a factor of importance in the problem of central station heating. Even electric railways, which are perhaps the largest producers of elctricity, and which produce it at the lowest cost, are in many instances abandoning electric heating in their cars, while many central stations already sell their exhaust steam for heating, but make no effort to sell the electric current for that purpose.

Central station heating follows the same general laws which govern isolated installations. When the sale of steam is the main business of the plant, and there are no engines on which low back pressure must be carried, the steam pressure is high enough to force circulation to extreme distances, and in some cases even to run engines. Pressure reducers are supplied at the point of use to give the customer whatever indoor or secondary pressure he needs. Where part of the steam supply is from the exhaust of engines driving dynamos—as is often the case in modern plants—the pressure must be so low as not to interfere with the proper working of the engines. This necessitates larger mains, and is sometimes accompanied by difficulty in securing prompt and effective circulation, particularly where the mains are long and not well designed or located. The branch pipe leads to the house mains identically as if supplied by a local boiler. The indoor distribution may be either one or two-pipe, and needs no special design to fit it for central station work. It does not

pay to bring back the returns to the station. The cost of the second pipe properly insulated, its rapid deterioration, and the frequent presence of oil or other foreign matter, has led to the abandonment of this practice. It is customary to install an "economizing" coil near the front of the house, over which external air is admitted, giving the necessary indirect heating and ventilation. The returns from the radiators pass through this coil, giving up practically what heat is left in them, and are then trapped to the sewer.

The main distribution system is, of course, always under-ground. The pipes must be large, and their temperature being high, they must be thoroughly insulated with the best of material. It is also necessary to run a drain line of tile underneath each pipe line to prevent water from collecting and standing around the steam pipes. Suitable expansion joints, or "variators" are provided at frequent intervals; also man and hand holes for access to valves, joints, etc. Care must be taken in laying steam lines to prevent accumulations of water, all low points or pockets being drained and trapped to sewer. The steam system readily takes care of plants which have been installed to use hot water, as they have a surplus of radiating surface, and only a few very simple changes in the pipes are required.

Hot water systems are usually operated from central electric plants utilizing their exhaust. This has passed



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through closed exhaust heaters of large capacity, the outlet being to the atmosphere either direct or through a back-pressure valve. If the heaters are of ample capacity and properly arranged, there need be no back pressure. The water may be given any desired temperature up to 212 degrees Fahr. and is circulated by steam pumps. There is an outgoing and a return main, the distribution being what might be called multiple-series. At each building served a connection is taken from the supply main and serves the radiators, which are themselves in series or multiple-series. The returns are finally collected and go to the return main. There are a few instances of single pipe mains, the returns going back to the same main, being diverted to the house by a shunt.

There are two methods of regulation. In some cases the water is sent out at a constant temperature, and each individual user controls his radiators just as he would with his own plant, turning them on and off at will; or he may regulate them automatically by thermostats; or the entire plant may be handled by thermostats. In such an installation the speed of the pump varies, being controlled either automatically by a thermostat, or by an attendant who judges of the heat requirements by the temperature of the return water. In other installations the pump is operated at a fixed speed, the temperature of the water being changed with the weather. By adjusting the radiator valves of such installations the proper amount of water can be kept circulating through them, the customer thus being relieved of all care in the matter of regulation. The station attendant keeps close watch of an external thermometer, and raises or lowers the temperature of the outgoing water to correspond.

When the exhaust is insufficient, live steam may be admitted to the heaters, just as it would be turned into the mains with the steam system. In either case, separate boilers may be fired, discharging steam or hot water directly into the mains without the intervention of engines or heaters, a practice often followed.

In some few cases the attempt has been made to store surplus exhaust or its heat, at the time of maximum electric load, for use at times of maximum heat demand, but this involves considerable investment of capital and space, as well as a number of difficult mechanical problems. This is a feature of the work which will repay further study.

For some time efforts have been made to interest owners of electric plants in heating, with a view of utilizing their exhaust steam. Nearly all small plants—and many of medium size, as well as a few large ones—are non-condensing. On its face the proposition is attractive. Here is a waste, or by-product, which can apparently be sold at practically the full value of the original steam. The demand for heat comes at the time of year when there is the maximum demand for light, and when the greatest amount of coal is being burned anyway. Another attractive argument is that the thermal efficiency of the ordinary engine is only about 10 per cent, rising in rare cases of exceptional importance to 15 per cent. The remaining 85 per cent to 90 per cent can be saved and made revenue earning by turning the exhaust into heating mains. The companies already sustain business relations with their prospective heat customers, and many would be glad to contract with them for heating. In many cases additional contracts for light and power can be secured which are not now available, as the owner must run his boiler for heating anyway.

It would appear that the scheme ought to present no particular complications in view of the universal use of exhaust steam for heating in isolated commercial buildings. In studying the subject a little closer, however, some difficulties arise. In the first place, the use of exhaust steam has usually necessitated a considerable back

pressure on the engines, thus straining them beyond what they were built for, and reducing both their capacity and efficiency. Surprising as it may seem, it has been seriously claimed that not only is back pressure not objectionable, but that it is, on the whole, rather a good thing for an engine, as forcing it to buckle down to its work closely and restraining its desire to shirk. The testimony of builders and operators of engines is cited to show that no diminution either in capacity or efficiency is noticeable.

The fallacy of these statements has been amply demonstrated by Mr. Albert Spies and Professor Whitham, in communications to "Heating and Ventilation," for March and August, 1894, showing that the water rate per indicated horse-power hour increases fast with high back pressures. This would not be material if the demand for heat always equalled or exceeded that available from the exhaust. But this is frequently not the case, as is shown by Figs. 3 and 4. The situation is improved by separating the exhaust into two mains, and allowing only a portion of the engines to exhaust into the heating mains when the demand for heat is small. The exhaust from the remaining engines then goes direct to the atmosphere, without back pressure, or to the condenser.

It has also been stated that the effects of back pressure may be overcome by simply carrying a little higher boiler pressure. As even in simple engines the initial pressure is four or five times the mean effective, the boiler pressure would have to be raised by more than the amount of the back pressure. As most plants are already working close to their safe limit of boiler pressure this is rarely feasible.

How much heating patronage may an electric station properly take on? Let us assume a station having 1,000 horse-power of rated boiler capacity, divided into, say 5-200 horse-power units. One of these should be kept in reserve for cleaning and repairs. The remaining four boilers, rated at 800 horse-power, if of good modern design, will easily develop during the hours of maximum load, one-third additional, a total of 1,067 horse-power, equivalent, let us say, to the evaporation of 32,000 pounds of water per hour. Allowing 5 per cent for leakage and condensation losses through pipe system, engines, etc., and 15 per cent for heating feed water, a maximum of 25,600 pounds per hour of exhaust steam is available to be sent out into the heating mains. The loss due to condensation and leakage in the mains cannot be definitely determined, and is, in fact, variable, not only in different plants but in the same plant. It probably varies from 5 per cent upward, but under no conditions should it exceed 25 per cent. On the latter basis 19,200 pounds of steam is available per hour for use in buildings. The condensation per square foot of average ordinary direct radiating surface, under the most severe conditions, runs from .25 to .3 pounds per hour. On the basis of the latter figure, the steam available will supply continuously 64,000 square feet of radiating surface.

In heating, however, there is a load factor, just as there is in light and power. Experience has shown that no matter how many lights, motors or radiators may be connected to the station, they are never all on at once. Many stores, theatres, offices, rooms, and sometimes entire residences, are only in partial use, and are, perhaps, entirely out of use at certain times. I have been unable to secure any exact data as to what this load factor actually is for heating. It depends, of course, upon the system of service, and also on the rates, and whether flat or by meter. It would appear conservative, however, to put the average figure at 80 per cent, on which basis it would be safe for the station under discussion to contract to serve 80,000 square feet of ordinary direct radiating surface, or its equivalent. All of this is based on the assumption that the plant is primarily an electric station, and that it has not as yet been thought wise to install additional boilers or apparatus for the sole purpose of supplying heat. This

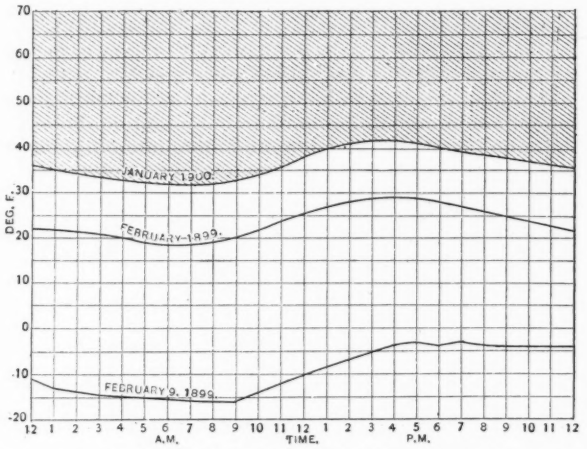


Fig. 1 Showing Mean Hourly Temperature Readings for the months of January 1900 and February 1899, also the coldest day of the year 1899. From the Records of the U. S. Weather Bureau, St. Louis, Mo. The hatched area indicates the heat which must be supplied to maintain the usual indoor temperature of 70° F.

may come later, but the attitude of the average plant today is that exhaust steam, and not electricity, shall be the by-product, the object being to increase the efficiency of the existing plant and force of operatives.

The above computations indicate that 80 square feet of radiating surface may be connected for each rated boiler power of plant, assuming the usual boiler reserve of 20 per cent, and ability to overwork of 33 per cent. If we assume that the radiating surface throughout the city averages one square foot to 75 cubic feet of space heated, each boiler horse-power will take care of 6,000 cubic feet.

The above figures are conservative. Under favorable conditions it would often be safe to take on 100 square feet radiation for each boiler horse-power, or 7,500 cubic feet of space. For severe conditions, however, the last-named figures are too high.

Most electric stations keep records from which curves or charts are plotted, showing the output throughout the twenty-four hours. No such charts seem to have been kept by heating stations. The data ought to be easily secured by simply noting the temperature or speed of pump in the water system; and by hourly, or half-hourly readings of counters on boiler feed pumps in live-steam stations. The demand for heat must, of course, closely follow the fluctuations of external temperature. I have secured from the St. Louis office of the United States

Weather Bureau some interesting hourly temperature readings. Fig. 1 gives the average hourly temperature in St. Louis, Mo., for January, 1900, which is, perhaps, a fair average winter month. Fig. 1 also shows the curve for February, 1899, one of the coldest months. Also the readings for the coldest day of that month, which was, in fact, the coldest day of the year. The cross-sectioned area between the average line and 70 degrees represents the heat which must be supplied to maintain the usual indoor temperature. This is a maximum between 6 a. m. and 8 a. m., and a minimum about 4 p. m. The range, however, is smaller than would ordinarily be assumed. In most heating systems, however, particularly those not regulated automatically or from the station, the demand for heat would not follow the curve exactly, but would lag behind it, an appreciable interval of time being necessary to make the external changes of temperature felt indoors. Furthermore, some normal deviations are to be expected. The most important of these is probably the turning off of heat in unoccupied buildings at night, and the shutting down of the heat in residences at bedtime. These would all be cut in again early next morning. This effect undoubtedly exists, but to what extent is difficult to determine.

In Fig. 2, the curve showing the heat required to maintain 70 degrees has been inverted, and a correction intended to indicate what the actual demand for heat will probably be, has been made. In Fig. 3 the revised curve has been plotted upon an average load chart of an electric light station, and in Fig. 4, upon an average load chart of an electric railway station. In both cases the maximum output of steam for heating is made the same as the existing maximum for electric service. It is assumed that enough steam heating has been taken on to load the plant to this point, and that the boilers reach their maximum output twice daily, once for heating and once for light or power.

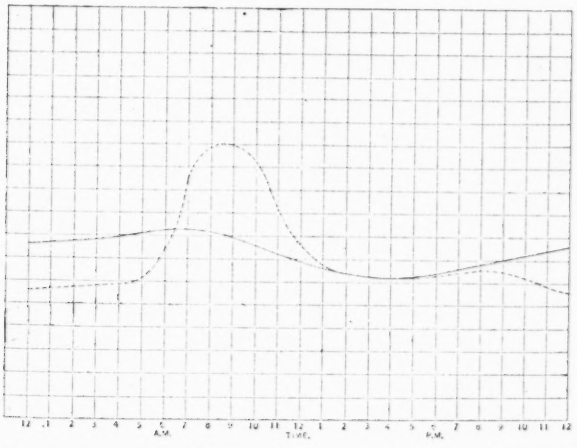


Fig. 2. Curve of Hourly Heat Demand with Corrections Indicating Probable Demand on Station.

Fig. 3 shows that for five-sixths of the time the demand for heat exceeds the exhaust available, and that live steam must be used and additional coal burned for heating. From one-third to one-half the steam required during this period can be supplied by the exhaust, and the economy of the engine is of minor importance. Back pressure during this period is not objectionable, as the reduction of capacity, if noticeable, can be met by putting in more engines. For the remaining 15 to 20 per cent of the time the exhaust exceeds the demand, and one-third to half of it goes to waste. The losses in engine capacity and efficiency from back pressure during this period are serious. It is clear that the crying need of this service now is a satisfactory apparatus by which the exhaust now wasted during the "peak" of the electric load, can be made available during the hours when there is a deficiency of exhaust.

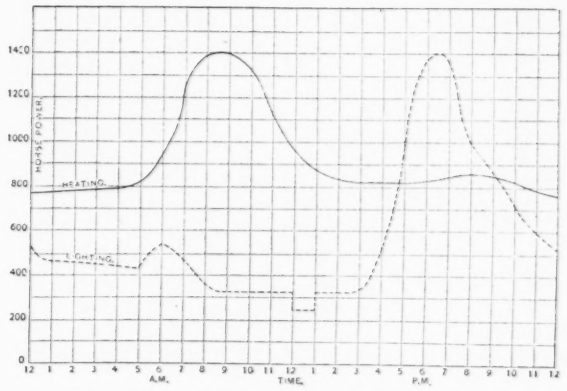


Fig. 3. Curve of Hourly Heat Demand, compared with the Output of an Average Electric Lighting Station, both reduced to Boiler Horse Power.

Fig. 4 shows that the heat demand corresponds far better with the load of an electric railway, which indicates that exhaust heating is a better proposition for railways than for lighting plants.

Fig. 3 indicates the difficulty under which the average electric light station labors. No scheme of electrical storage having yet been found sufficiently cheap and efficient to come into general use, electric stations must generate current exactly as their customers use it. For a few hours each day, therefore, the plant works at its maximum, but for over 80 per cent of the time a large portion of the equipment is idle. This adds greatly to the cost of generating electricity. Station managers are always on the lookout for means of making the work of the station more uniform, and of utilizing their station, equipment, and force, more hours each day. Central station heating offers advantages in this direction, as the entire boiler equipment and force can be utilized to advantage when the electric load is small by supplying directly from the boilers whatever deficiency there is in the exhaust for heating.

Is it possible to weigh the exaggerated and conflicting claims of the advocates of the steam and hot-water systems with a view of reaching an unbiased conclusion as to the particular features in which one or the other appears preferable? While it cannot be hoped that such a conclusion will meet the approval of either party, the interests of sound engineering would appear to make the attempt worth while. It is assumed, to begin with, that each installation is to be put in in good faith, and that the material and workmanship is to be first class in both cases.

The following points of advantage appear to be with the steam system:

1. Simplicity. There being a single pipe line and no pumps being necessary.

2. The equipment or plant appears to be more durable. The life of underground pipe lines carrying steam has been shown to be much greater than those carrying hot water.

3. The investment in radiators for utilizing the heating service is less by the usual ratio between steam and hot water radiators.

4. The system will satisfactorily serve buildings which have been equipped for either steam or hot water heating. A hot water plant cannot handle a building equipped for steam heat, except at considerable expense for reconstruction.

5. Less pressure being carried there will be fewer leaks, and less liability to damage in case of accident.

6. Leaks may be repaired, valves packed, etc., without the necessity of shutting off the entire house.

7. The steam people have whatever advantage results from long experience in the heating business, and the construction and operation of many plants under wide ranges of conditions.

The following advantages appear to be with the hot water method:

1. Cheapness of installation, although this is to some extent off-set by the necessity for a return line. The low temperature makes it unnecessary to provide as many expansion joints, or to use as high a grade of insulating material, while the fact that the medium is water renders sub-drainage unnecessary.

2. Milder temperature, which is preferable in radiators, hot water now being used almost exclusively for residences. The low temperature also reduces the radiation

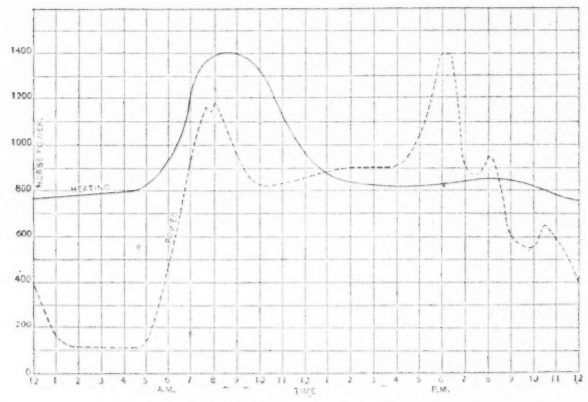


Fig. 4. Curve of Hourly Heat Demand, compared with the Output of an Average Electric Railway Station, both reduced to Boiler Horse Power.

losses, which are proportional to the differences of temperature.

3. There being no waste to sewer, either at low points or at discharge from residences, there is no loss of water or heat at these points.

4. Water appears to adapt itself readily to regulation, either automatically or by an attendant at the station.

5. Water appears to lend itself better to heat storage, which, as is shown in Fig. 3, would improve the economy of the station.

6. Operation without back pressure. While this is of less importance than would appear at first glance, it nevertheless should have the earnest attention of the steam advocates.

7. There are no offensive odors from the air valves or stuffing boxes of radiators.

8. It would appear to be easier to discover and locate serious losses of water or heat.

There appears to be no choice between the two systems in the matter of power required to circulate the heating medium. Fig. 3 shows that for five-sixths of the time the demand for heat exceeds the exhaust available, so that neither the back pressure on the engine nor the running of a special pump, would affect the total steam to be generated, as there is always a deficiency to be made up direct from the boilers. Both systems are wasteful in this respect during the peak hours. If, by the adoption of modern methods, steam can be distributed without back pressure, the system will then have an important advantage over water.

It would appear possible to meter both systems. The use of steam could be measured either directly by steam meters or by hot water meters on the returns. In those water systems carrying constant temperature and changing the speed of pump to suit the demand, the water could also be metered. This could not be done, however, where the speed of pumping is constant and the temperature is varied.

It would be risky to hazard a recommendation as to choice of system, as every proposed location would vary in its conditions and requirements. Some general observations may be in order, however.

If the capital available is limited, and the most ground must be covered for the money, the water system would probably be selected. If the city to be served is hilly, or has many tall buildings to be served, the water system would appear to be undesirable on account of the high pressures which would have to be carried in order to reach the high buildings or districts, this pressure being likely to cause trouble in the low districts. If a preliminary canvass of the city shows that a majority of the buildings to be connected are already equipped for steam heat the steam system should be adopted, while a majority of hot-water plants would "indicate" that system.

As more steam is required to heat a building than to light it, a central plant can secure a sufficiently large heating patronage much closer the station than it can its light patronage. If the buildings to be heated are close at hand, so that the investment in expensive mains can be kept down, the advantages would be with the steam proposition. On the other hand, if considerable area is to be covered, considerations of first cost might limit the system to water. A point which appears to hamper the water system now is the uncertainty as to the life of underground pipe lines and their insulating conduits. Until the system has been in service for long periods of years, under all sorts of conditions of soil and climate, there will continue to be some hesitancy on the part of capital.

Not all electric stations can enter the heating field with profit. Many are located too far from the district to be heated. Cheap fuel and water, and ample room for pres-

ent arrangement and for growth, usually determine the location of plant. In other cases the topography is such as to make it an attractive proposition for neither steam nor hot water. In some places the price of fuel is low, and in others the people have not been educated up to the point of appreciating artificial heat under modern methods, and could not be induced to pay a profitable price for it.

The rates charged for heating in different cities and under different conditions vary considerably. The conditions controlling the price are the cost of fuel, the distance the service is carried, range of external temperature, and number of months of service. In most cases the charge is for a season's service, and is based either upon the square foot of radiation, or 1,000 feet of space heated.

For some years it has been the almost invariable practice in isolated steam-heating plants to use one of the vacuum system of handling aair and returns. Heating in modern buildings is now done without back pressure on the engines. The use of such systems is entirely practicable in connection with central heating plants, and there have been some successful installations of this character. Their use, of course, adds somewhat to the complications, and materially to the first cost. The recently developed vacuum air valves—which prevent the return of air into radiators—seem well adapted to this purpose at small cost, in connection with steam systems. There use would necessitate carrying a pressure of several pounds on the system for a few minutes every day to blow the air out of the radiators, but this could be done at a time when live

One View of the Handsome Store of Watkins & Radcliffe, Detroit, Mich.

The rates for hot water vary between 12½ cents and 20 cents per square foot of radiation. For steam, the range is from 15 cents to 30 cents, although a rate of 50 cents is reported from Seattle. The charges run from $2.50 to $5.00 per 1,000 cubic feet of space heated, which, of course, is independent of whether steam or water is used. A slightly higher charge is made for indirect radiation. When steam is sold by meter, the unit is the kal, which is the amount of heat required to evaporate one pound of water. This charge varies from 45 cents to 80 cents per 1,000 kals, depending upon the customer's requirements.

Experience in hot water plants indicates an average consumption of coarse slack of about 55 pounds per square foot radiating surface per season. If we assume that one square foot of surface heats 50 cubic feet, then 1,100 pounds of coal will heat 1,000 cubic feet of space; or with slightly better coal it may be said that one pound per season will heat one cubic foot of space.

steam was being used, anyway. Traps of special construction would also be necessary to discharge the return into the sewer when there is no pressure in the system, and without admitting air.

Some revenue may be secured from the heating of hot water tanks, for baths, laundries, kitchens, etc. This service, however, is usually desired for the entire year, and it is only in rare instances that sufficient revenue can be secured to justify carrying heat on the mains during the summer months.

In Fig. 3 the curve represents the maximum output of both light and heat. In mild weather the heat curve would have the same general characteristics, but the output would be much less, and for considerable periods in the fall and spring, it might even drop to a point where the demand was equal to or less than the exhaust during periods outside of the peak. At such times no steam would be used direct from the boilers, and absence of back pressure on

the engines would be of importance. This would also hold true for a considerable period after a new company enters the heating business, as it would require some time to secure enough contracts to utilize the full capacity of the boiler plant. During all these periods of service the exhaust might be ample.

The steam people claim that the demand for heat will soon reach a point where in cold weather it will utilize all the exhaust available, even at the peak of the electric load. If this is a fact, then Fig. 3 shows that the demand will be some 50 per cent greater between 5 a. m. and 7 a. m. If the electric plant is worked to the limit of its capacity at the peak, as has been assumed, it would then be necessary to install additional boilers to take care of the early morning heating load. This changes the entire aspect of the problem and makes the station one which produces heat and sells its electricity as a by-product. Such an installation may often be justified by circumstances, but it is foreign to the present discussion, which presupposes no additional investment at the station on account of entering the heating field.

It is true that steam at atmospheric pressure is not quite as effective as steam at 5 to 10 pounds pressure. A good vacuum system of air removal would in most cases make the radiating service sufficiently more effective to overcome this difficulty. But as the maximum demand for heat comes at an hour when live steam must be employed anywhere, there is no objection to carrying a somewhat higher pressure for short periods to overcome any deficiencies which may be found.

What is the best thing for a central station to do with its exhaust—put in condensing apparatus and increase the capacity and efficiency of its engines 20 to 25 per cent; or to run non-condensing, and sell the exhaust for heating?

Many points must be considered in answering this question, such as cost of fuel, cost of plant and water for condesing, capacity of engines, and work required of them, hours of loading, amount of the heating that can be secured, etc. Condensing increases the value of the steam only 20 to 25 per cent as a maximum, while the sale of the exhaust for heating should bring 75 to 80 per cent of its original value. It is evident, therefore, that when the exhaust can be sold for heating at fair rates and without too large an investment in plant, it is more profitable to do this than to condense. If the amount and duration of the load and the price of fuel are such as to justify condensing apparatus, it could be kept in operation throughout the non-heating season, and also during the heating season on those units from which the exhaust was not needed for heating, particularly during the peak of the load.

Another View of Watkins & Radcliffe's Store.

A concise statement of the advantages to the customer, the electric plant, and the general public, resulting from the installation of a central heating plant, may be worth making. The customer saves the expense of coal and ash handling, with their unavoidable accompaniments of dirt, dust, smoke and soot. The saving of labor is a considerable item, particularly in large plants. The heat supply is regular, continuous and unlimited, and is available throughout the entire night and on Sundays and holidays. The building need never become cool. The heat is capable of regulation and adjustment with fluctuations in the external temperature. Valuable space in basements and cellars is saved, there being no longer any necessity for boilers or coal storage. It is possible to have a cool cellar, which is often an advantage where it is desired to keep vegetables or provisions. Insurance rates, too, are less where there is no fire in the building.

The service demanded of the ordinary heating boiler is

so variable, and it has so little skilled attention, that its thermal efficiency is very low, rarely exceeding 50 per cent, and averaging probably not over 35 per cent. Furthermore, in order to keep fire over night, and to avoid making a smoke nuisance, it is almost imperative in many ordinary heating plants to burn the most expensive grade of the very best coal. In large St. Louis residences, for instance, anthracite lump of 13,000 British thermal units per pound, costing $7.00 to $8.00 per ton, is burned, with an average efficiency of 35 per cent. Under the boilers of a central heating plant, slack coal or screenings, costing $1.00 per ton and having a calorific value of 10,000 British thermal units, would be burned, with an average efficiency of 60 per cent. The fuel cost of the isolated plant under such conditions is ten or twelve times as great as that of the central station.

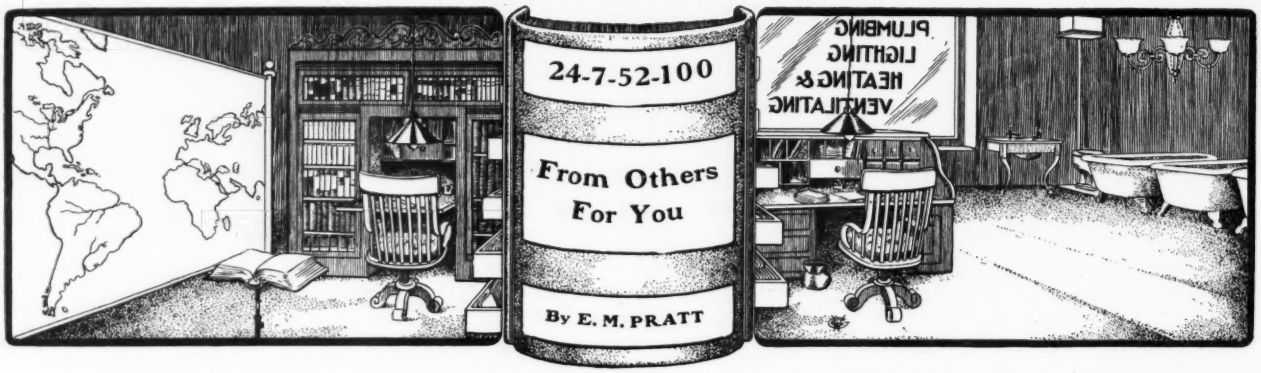
The heating business has attractions to central electric stations aside from the mere profit which the books may show. It adds to the permanency and security of the company's business, and, therefore, places the capital invested upon a more attractive footing. It often enables the company to secure contracts for electrical service which it would not otherwise get. The most difficult condition which the salesman of electric light and power meets is where the owner must retain and operate a boiler plant to heat his building. He argues that the additional expense and inconvenience of operating engines and dynamos for light, elevator and power service, are not great. When a central station can supply heat as well as light and power, it is in a position to meet this argument and permit the customer to remove his boilers and utilize the space for other purposes, besides doing away with the many nuisances connected with the operation of his own plant, particularly through the summer.

There are advantages to the general public in central station heating in the concentration of the plant in an out-of-the-way location, in the reduction of the number of coal and ash teams on the streets, and the removal of the smoke nuisance, aside from the direct benefits obtained by those who make connection with the plant.

There are many incidental advantages connected with the use of central station heating beyond the mere saving of fuel. This service—while in many cases a necessity—is in some instances a luxury, and it should command a price accordingly. It is worth much more to a customer than the mere amount he saves, and he should be willing, therefore, to pay the central station a rate which will enable it to earn a fair return on the necessary investment.

While these notes indicate that there are many cases where central station heating would not be profitable to electric plants, it is nevertheless a fact that many cases exist where a small investment in this direction can be made to yield handsome returns. Just what can be done in any particular case, and whether steam or hot water is preferable, and what the details shall be, can only be determined by an intelligent and exhaustive study covering all local conditions. It goes without saying that such a study should be made by disinterested and competent persons who have no interest in the matter further than to discover and reveal to their employers all the facts bearing on the case.

JOHN CAMPBELL OF PATERSON, N. J.
Chief of Paterson Caledonian Club.



Let the big book of drawers full of envelopes represent the medium between you and me. Imagine that the drawers slide both ways and that the envelopes are alphabetically indexed on both sides. My work is to go into all the world to collect better personal, professional and commercial methods useful to you in your work during the day, the week, the year, the century. This page is for the exchange of questions, answers and experiences.

LIFE IS WORTH LIVING WHEN WE KNOW HOW TO LIVE AND LIVE AS WELL AS WE KNOW HOW.

THE NEW PAUL POINT PLAN

"YOU CAN'T DO BUSINESS AND ——"

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FROM the "Forest City" comes a very warm question and I have been told that others would like to ask me the same thing. It takes time to do some things, but before Buffalo begins to sleep on cots I may let in daylight on the English laid before the readers of this magazine. When a big building is started the workmen start down and to a man from Mars might be apparently going in the wrong direction. But after the earth is removed, the spiles driven and the foundation fixed, then something begins to go up and remain up.

IT MUST have been all of a quarter of a century ago that I heard a Pennsylvania merchant tell about his blue days just after his store had been destroyed by fire.

This month I heard a Chicago manufacturer tell how he wanted to leave the city and become a farmer on account of discouragements and dark outlook. Arcadia at a distance was compared to pandemonium near at hand.

Another man has just told me about the depressing effects of a recent visit he paid his boyhood home. All who were men in his youth are now dead or dying and he got a new view of time that is fleeing fast.

A few days ago I attended the funeral of a friend—a man more than a dozen years older than I and a man whom I greatly admired. But I never told him how I respected him—he didn't know how much I admired him and I felt the folly of tears and flowers at his casket.

During days of trouble, perplexities, regret and strain we need a reserve of nerve, confidence, hope, faith and friends. Last year a man added the following record to my collection of personal experiences and methods:

The son of a manufacturer had taken his life in a most horrible manner, due to some social trouble. The father was unable to recover from the shock and during the funeral day two of his big-hearted friends took him to an upper room. There they sat down with him and without saying a word each man took one of his hands in theirs. For hours they remained that way in silence. Then a change came over the father and he said to his friends: "You have saved me!" And do you think those two men ever did a better day's work?

HEARING a man on the street say to another man, "You can't do business and——" and not catching the latter part of the sentence, I have asked several how they would finish it. The following are some of the bi-research products:

"You cannot attend to business and be a crank on some other subject during business hours."

"You cannot attend to business and permit personal troubles to take up your attention."

"You cannot correctly attend to business and serve some other god in the gold field."

"You can't do business without capital and compete with those with capital unless you know a good deal."

"You cannot do business with business men very long and have poor methods."

"You can't do business and do up your customers also."

"You can't do business and have much to do with real society."

"You can't do business very long and neglect your health."

"You can't do business as you should do it and take no personal interest in your employes."

"You can't do business and do everything else everybody asks you to."

"You can't do very much business in a place after the business has left the place."

"You can't do business and think of something else at the same time."

"You can't do business when you should be asleep and do your duty to your next day's work."

"You can't do business and remain stationary or neglect it."

"You can't do business very long on a past reputation."

"You can't do business and give it a secondary consideration."

"You can't do business and ride a hobby horse at the same time."

"You can't do business and neglect to study with great care the methods of others as well as your own."

CAUSES OF COMMERCIAL NON-SUCCESS.

IV—Lack of System.

IF all the direful sources of business failures, lack of system is perhaps the most insidious. "Order is Nature's first law," declares the sage, but most of Nature's children are born lawbreakers in this respect. System, a genius for doing everything at the right time, for keeping everything in the right place, is for most people an acquired habit, but a very powerful habit when once acquired. So powerful as to fairly enslave those who are its professed devotees. But it is not of such that your scribe would write.

There is a healthy habit of system which may be learned by the man who is naturally most careless and which will serve as a balance wheel for his energies, keeping his working forces at constant pressure and tending to direct them in the proper channels instead of wasting them in ineffectual effort.

You all know the difference between the bustler and the hustler. The one fairly fans the air in his effort to accomplish things. He is all energy, rushing here and there, taking things up and laying them down, making tremendous effort, and accomplishing nothing. How different the hustler! He, too, is a bundle of energy, but it is energy well directed. He puts heart and soul into his work, but he also puts brains into it. When he makes a movement it counts. His work is done with the least possible amount of friction, and whenever he takes hold of an enterprise things happen.

Now what is the difference between these two men? Simply this: The hustler has method, system, in his work; the bustler has none. The hustler has a well defined plan of action before he enters upon an undertaking; the bustler does everything haphazard. It is not difficult to see the logical end of these two men. The hustler will "come somewhere." Men will look up to him as a leader. His affairs will prosper. The bustler will burn himself out before his time and his friends will say, "Poor fellow, he worked hard enough, but luck seemed to be against him."

To take a concrete example: A certain business man who was at the head of a large concern, was noted among his business associates for his ability to turn out work. He daily attended to a mass of details which would have swamped most men, and that with the utmost apparent unconcern. His plan was a very simple one, but it took some self-restraint to carry it out. Every morning, when his mail had been opened and the affairs of the day were well in his grasp he took a quiet quarter hour in his private office and thought over the day's work. Then he went at it in an energetic manner and everyone marveled at the apparent ease with which he accomplished whatever he undertook. There was no haste, no confusion, no decisions made only to be reconsidered, no orders given only to be revoked. His work and the work of those under him was definitely laid out, and while his plan was not followed slavishly it gave consistency and sweet reasonableness to everything that was done in that establishment.

This subject of system is a vital one because neglect of method in any department of a man's business may be the waste at the bung which more than balances any watchfulness at the spigot. Speaking with a young man who is making his business mark in the plumbing and heating field, your scribe happened to mention the importance of carefulness in estimating on contract work and was told of a man who has been many years in the plumbing business and who literally keeps himself poor by clumsy work on his estimate blanks. He has a jobbing business which yields him several thousand dollars profit per year and if he would shun contract work he might close his books on a very nice balance every year. But in the old days, before competition became so keen, he used to make money on contract work and now stubbornly refuses to be dropped out of the procession. He has no genius for close figuring, so he makes a more or less careful guess as to what the job will cost, adds the minimum of profit—lest someone else should get the job—and almost invariably finishes the job at a loss. Such a man not only does not make a success of his own business but he is the demoralization of the whole trade in his locality.

To undertake to help him out of his difficulty would be to undertake to remodel his whole nature. He is a good workman and employs only good workmen, so that he has for years retained his patronage on jobbing work, in spite of keen competition, but his business methods are slipshod in the extreme.

It would pay him to employ a first-class man to look after the office end of his business. A trained business man would work wonders in the old shop. In the first place he would have the subject of discount at his finger's end so that he would be able to tell at once at what figure every fixture and fitting that went out on a job should be charged in order to give a reasonable advance on actual cost price. Then he would have some system in estimating on a job, so that every slightest detail of the work should be properly accounted for and the proper charge made. Many a job has brought loss rather than profit because some important item was forgotten in the estimating. Finally he would not be afraid to ask a fair profit for his work, counting it not good business policy to put too cheap a price upon his work. It is all very well to "keep the shop busy," but on the whole it is short-sighted policy to do work at a loss even in dull seasons.

In the arrangement of office and shop, and in the management of important details the trained systematizer would work another reformation. A tasty show room would be his first aim, for he would remember the axiom, "Goods well displayed are half sold." The shop would be transformed from a disorderly scrap heap to a neatly arranged storage room, with a place for everything and everything in its place. And last, but not

least, the business of the establishment would be transacted in a businesslike manner. System would take the place of guess-work in the matter of ordering stock, and supplies would come in just about as needed, doing away with unprofitable waiting and constant running to the supply house. Collections, too, would receive constant attention, and he would not be afraid to press payment upon those who were habitually slow. His own accounts would then be promptly attended to and if he gave a note to his supply house it would not have to go to protest but would be met promptly. Better than that, he would soon be in position to take advantage of the cash discount, in itself a nice little profit on goods. And, finally, by careful bookkeeping, he would know at all times his exact standing; what his profit on each particular job, and what his profit for the year. In short, he would have raised the business from a basis of chance to a basis of certainty, from a speculative venture to a solid business enterprise.

V—Lack of Attention.

TTENTION! For some of us the word instinctively brings heels together, toes well apart, body erect and eyes to the front. It means readiness for the next command, whatever it may be. That is its passive meaning, readiness for action. And it is a very good attitude for a business man to assume as a matter of habit. The world has great need of men who are always ready for action. It is a secret of success in business as well as in war. The great Napoleon was always a day's march into the enemy's country before the enemy fully realized that war was on. So it has been with all the great Napoleons of finance. They have been ready to take advantage of any turn of affairs and have been miles away with the worm while the sleepy birds were rubbing their eyes open.

But there is another shade of meaning to the word attention—the active sense. It comes from a good old Latin word meaning to stretch out toward, to strive after. It was a word much used in the Roman contests of strength and endurance, a word of the race track. We can see the trained runner stretching out toward, striving after the goal. Those of you who have ever done any work on the cinder track know what it means. A man must be in the pink of condition, muscles flexible and sinewy, head cool, heart stout and wind sound. Well, a business man who is stretching out toward, striving after any marked success must keep himself in the same condition. Anything that unfits him for business—irregular habits, late hours, excessive indulgence in stimulants, all these befog a man's brain and unfit him for the day's work. And if persisted in they will eventually put him well out of the race.

It is related of the late Philip D. Armour that he kept in as constant training for his business as a foot ball enthusiast does for his team work. To keep a clear head he required nine hours sleep, and found by experience that the nine hours best suited to his needs were between nine p. m. and six a. m. Accordingly he made it a habit to retire at nine o'clock, and no amount of persausion could keep him out of bed after that hour. The rule cost Mr. Armour many friends, no doubt, but to it he attributed much of his business success.

So much for preparation for the day's work. How about the conduct of the day's work? The day has passed when it was counted good business practice for a man to make his office or his store the lounging place for all the loafers in the neighborhood. It was a sociable habit and some mighty good yarns used to be swapped around the old store, to the accompaniment of pattering tobacco juice. But modern business methods have no reverence for time-honored customs and the man who aspires to do business in an up-to-date manner will put up a "this-is-my-busy-day" sign and invite Uncle Billy and his gang of story-tellers to find some other lounging place. Then he will pitch in and try to seem busy, even if he isn't, for the latter day public is very much like heaven in bestowing its favors. "To him that hath shall be given." The wise plumber will make a great show of looking over his engagement book and deciding, only after much deliberation, that he can put some other job aside for the time being and attend to this particular job at once. A hobo once delivered himself of this bit of wisdom: "It's easy enough to get a job if you've already got one, but if you're out of a job it's a h—ll of a job to get another." And he was right. If you want a thing done right and done in a hurry go to a busy man. He will turn it out in half the time a jobless man will do it in, and moreover he will do it properly; and the public recognizes this fact. Therefore keep up the appearance of being busy and you will be surprised to see how many things there will be to engage your attention if you really make an effort to do business in a businesslike way. The man who is honestly seeking to improve his business methods will find that he has undertaken a work which will keep him busy for about as many hours a day as he cares to put in.

And that brings us to another consideration. How many hours a day should a man put in? It depends on three things—the man, his methods, and his work. A man should put in as many hours a day as is required to keep his business shipshape. This is the first proposition. Some men can turn out in six hours as much work as others working just as hard can accomplish in eight or ten. That's the difference in men. And the second proposition is that during business hours a business man should attend to business only. That's method. Let him make his business hours as few as he conscientiously can, but during those hours let him be all attention! Let there be a constant stretching out toward, a striving after the desired goal—business success. Out of business hours let him follow any hobby that does not encroach upon his hours of rest. He will be a better business man for having some other interests, provided always that he is able to lay his hobby down on the threshold of the day's work.

And, finally, as to the work itself. There is such a thing as becoming a slave to one's work. Many a business man is like the fabled strong man of old, who made a daily practice of carrying a calf upon his shoulders. The calf persisted in growing and by and by he was carrying a full-grown ox. So in business life. A man shoulders the responsibilities of a small but growing business and as the business increases takes on an ever increasing load of responsibility, until he one day breaks down under the strain. Such a man lacks executive ability. If he were wise to his job he would unshoulder more and more, as the business warranted it, the back-breaking burden of detail, and assume the position of manager of affairs. If he has managed his own time and his own talents well he will have learned the art of managing others. That, after all, is the real secret of business success, not only to do your own work faithfully and well but to possess the knack of putting into others enthusiasm for their work. Attention—zeal in the work of the moment, readiness for the next thing that offers itself—let this be the watchword.

THE WORK OF ONE MAN.

By Captain A. H. Mattox, of New York City.

HE London Polytechnic is the greatest school of its kind in the world, and it is the result of the work of one man. Hon. Quinten Hogg, the founder and now president of this famous school, has come to this country to make a study of social and industrial betterment. In the work of social betterment the League for Social Service of this city, of which Dr. Josiah Strong is president, and Dr. Wm. H. Tolman is the secretary, is the pioneer in America. The London Polytechnic, under the direction of Mr. Hogg, has grown from a tiny night school and shelter for thirty homeless boys in 1865, to the largest technical school in Europe or America. In all movements of this kind of industrial betterment, as is shown in the work of Mr. Hogg, the most forceful element lies in the personality of the individual.

Mr. Hogg is a modest man and objects to being interviewed, but the following facts as to his life and work, were given me at the office of the League for Social Service, 287 Fourth Avenue, this city.

Mr. Hogg is the son of James Weir Hogg, once a chairman of the East India Company, and is the owner of sugar and coffee plantations in Demerara, besides being the head of a large West India firm. He does not suggest the typical philanthropist in the slightest degree, which may be one of the reasons for his remarkable success.

When Mr. Hogg, in 1863, left Eton his sympathies and interests had already been aroused in behalf of the working boys of London, especially for those who earned their livelihood in precarious ways, owing to lack of training which would enable them to obtain lucrative employment. Believing that the best way of giving aid is to teach the poor how to help themselves, and realizing the importance of a perfect knowledge of their mode of life, their temptations, necessities, etc., he at this time was in the habit of going about London in the disguise of a bootblack or newsboy, and the story is told that he frequently blacked the boots of his nearest friends without having his identity discovered.

By going among the working boys of London as "one of them," selling newspapers and blacking boots, young Hogg gained their confidence. His first class was composed of five newsboys, meeting in the river end of one of the great sew-

ers of London, where by the light of a candle stuck in a beer bottle, they studied and were inspired by this young enthusiast, to strive to educate themselves.

His heart has been earnestly in his work always, and the first step toward the beginning of the great London Polytechnic was taken when he took possession of premises in York street, Strand, where he opened a night school and gave sleeping accommodations, consisting of rough boards, to the homeless boys who were his pupils. A man of such earnestness is a power which must attract others, so some of his friends joined him when the exigencies of the work demanded it. Since this humble beginning the school has had a rapid but healthy growth, until to-day the London Polytechnic has an average attendance of 3,000 every evening, with a curriculum comprising more than 200 different classes.

Seventeen thousand students are now learning mechanical trades and practical pursuits in this London school. The members are young men from 16 to 25 years of age, and, in order to join the school, a student must be at the time employed in a trade, thus avoiding the evils of sending out imperfectly equipped artisans to compete with those already at work.

Mr. Hogg believes our bodies, as well as our minds and souls, need development and training, so at the Polytechnic there is a fine gymnasium, a swimming pool, and boat and bicycle clubs, in all of which the founder is the ruling spirit.

His recital of the vicissitudes and early struggles of the school, as given to the League for Social Service, was intensely interesting.

Mr. Hogg was asked to what he attributed his success with his efforts for the young men of the working class, and his answer is given in his own words: "I think the mistake of those who have failed in such work is that they have neglected the social element. Young fellows who have been at work all day don't always want, in the evening, to attend the prayer meeting or lecture, or even read books or magazines. They must have opportunity for amusement, recreation, and a friendly chat; in short, must play as well as work."

Such institutions, he said, are the best substitutions for the saloon and vices of all kinds.

Mr. Hogg has visited Pittsburg, Boston, Cleveland, Ohio, Chicago, St. Louis, and other great industrial cities, making a close study of the efforts being made in the United States to improve the condition of the employed.

Last week Mr. Hogg was the guest of the National Cash Register Company, of Dayton, Ohio, where he addressed the 3,000 employees of the establishment. During his visit at Dayton, and while he was investigating the great factories of this firm, the president, Mr. John H. Patterson, had the flags flying from every building in honor of their distinguished guest.

Mr. Hogg sailed last week on the Oceanic for Liverpool and returns to London greatly impressed with the great progress being made in this country in social and industrial betterment.

A. H. Mattox.

New York City.

EXCLUSIVE AGENTS.

The Richmond Stove Company, of Norwich, Conn., have perfected arrangements whereby they will act as exclusive agents for the United States Radiator Company, and push the sale of their goods in the New England territory during the year 1901.

Operation of the Mechanic's Lien Law in Illinois.

THE mechanics' lien law as a factor in building operations is a subject upon which there is room for a considerable range of opinion according to the standpoint from which it is viewed. Your scribe acknowledges himself to be inclined to look at the subject from the view point of the contracting plumber, while having honestly at heart the best interests of the whole trade, from journeyman to manufacturer. Indeed he finds it impossible to separate, even in thought, the interests of the individual factors which go to make up "the trade." The condition of the trade is very much the same as the condition of a chain—it has only the strength of its weakest link. At the risk of being trite particular stress must be laid upon this truism. Anything which has an injurious effect upon any branch of the trade has a corresponding ill effect upon all other branches.

Such an injurious effect upon the master plumber has the mechanics' lien law in its practical working out in Illinois. By its provisions it makes the owner of the building to be constructed practically a trustee for all material and labor employed on the job, thereby making it of little importance to the supply men whether the contractor to whom they furnish the goods have either capital or reliability since they can place a lien upon the building for the amount of the material furnished, which amount must be paid by the owner although he may already have paid the contractor the full sum of his contract.

To say nothing of the complications arising out of such a law and the hardship which may be visited upon the owner by its unjust provisions, it has a reflex action upon the building trades themselves. By its operation it makes a place in the building trades for a class of men who, while posing as contracting or employing builders have little or no capital, and absolutely no financial standing with the commercial agencies—and they need none. It is not their rating but the rating of the owner which is looked up when the material is ordered delivered on the job.

With such men as these the substantial men of the trade—the men to whom the supply houses look for the great bulk of their business—are compelled to compete. The one has nothing at stake, the other has much. The one may be and very probably is a fourth-class journeyman who, because he happens to have the price of a cheap sign and some stationery, sets himself up as a boss plumber whenever he happens to be out of a job. The other has an established place of business, carries a stock of material and supplies which runs up in the thousands, is a large employer of labor and in every way a substantial business man. Now, as a simple business proposition is he not entitled to some consideration from the manufacturing and supply houses? Has he not a right to expect that they will help him in his uneven strife with this thoroughly irresponsible competitor?

It is just here that the lien law makes it hard for the supply man to be true to the best interests of the trade. We will say that one of these free lances has secured the contract for installing the plumbing in a certain building. He has taken the contract at a ridiculously low figure, and away from good customers of the supply house. Without the protection of the lien law he could not get a dollar's worth of goods on credit. With it he can buy as much as the owner of the building is good for. And so he does the job, clears up less than day wages and turns over the bulk of the contract price to the supply house in exchange for a waiver of lien.

It would be a mistake to give the impression that all supply houses do business on this basis, or even a great proportion of them. But there is the temptation and it is apparently sufficiently strong in some quarters to make it quite possible for these ne'er-do-wells to get about all the supplies they need.

Far be it from your scribe to insist that credit should be granted only to those who can show a good bank balance. There are some good men in the trade whose check wouldn't be worth as much as the revenue stamp on its face. It is against the cut-throats in the business that he would aim his shafts—the men who have no qualifications whatever for the calling of boss plumber and who but for the credit extended by the supply men, could not stay in business a single day. Against such let the supply men join the masters of the trade in a war of extermination. The best interests not only of the trade but of the public at large demand it. Many of them are utterly incompetent to do a sanitary job even when it is laid out for them. Without supervision they do their work in a manner which is not only a disgrace to the craft but a serious menace to the health of the community.

DECIDES IN FAVOR OF INSPECTOR.

Denver, Col., March 12.—(From a Staff Correspondent.)—County Judge Lindsey in a lengthy decision yesterday, held that the city has authority over the new mint or the postoffice building in sanitary matters regulated by plumbing ordinances, and in consequence, J. A. McIntyre, contractor of the new mint, was fined $100. McIntyre put in plumbing without first obtaining a permit and of a kind not approved by the city. His defense was that the city had no jurisdiction over government property, the mint site having been ceded by the state to the federal government, which accordingly obtained sole control. This view Police Magistrate Thomas upheld, but an appeal was taken by the city. Says the opinion:

"It is not now and never has been the function of the federal government to make laws for the protection of the public health. This is purely a prerogative of the state. It has been not only recognized and conceded, but jealously guarded and protected by a long line of decisions of the supreme court of the United States.

"The health of the entire community might easily be imperiled by foul and pestilential gases which might emanate from defective sewerage and plumbing in the postoffice and the mint. Contagious diseases might be housed upon such premises in the very heart of a thickly populated community; filthy habits and vile practices might be indulged in upon such premises with impunity. There is no federal law protecting the public against such things and such protection is purely and peculiarly within the province of the police power of the state, a power that the federal government has always been the first to disclaim any rights on its part to exercise."

Fifth Annual Convention of the Indiana State Association of Master Plumbers.

MUNCIE, in the gas belt, was the scene of Indiana master plumbers' activities on Tuesday and Wednesday, March 12 and 13. About seventy-five members of the craft registered at the Kirby house, a first-class hotel for a small city, and from it sallied forth in squads and batallions to take their part in the program of business and pleasure which had been laid out for them by those having the affair in charge. This was the fifth annual convention of the Indiana State Association and if it may be taken as a fair sample they have reduced the convention proposition to a fine art. The delegates in attendance would do credit both in appearance and conduct to any organization of business or professional men.

The plans of the entertainment committee had made little provision for the transaction of business on the first day of the convention and aside from the routine of organization very little was accomplished in the way of business. In the none the less important feature of convention work, however, namely the promotion of better acquaintanceship and genuine good fellowship, much was accomplished.

In the first place the environment was most congenial. The Benevolent and Protective Order of Elks had put their elegant club rooms at the disposal of the entertainment committee as an act of courtesy to Mr. H. H. Highlands, who is a leading spirit both in the Elks' lodge and in the local association of master plumbers. One might travel over many states before he would find lodge rooms more elegantly equipped for the purpose of making a homelike resort for a band of jolly good fellows. Whether it was the spirit of the place or whatever the cause the visiting plumbers seemed to feel themselves very much at home and proceeded to make themselves so. It was hard to frame a vote of thanks which would adequately express the appreciation of the courtesies extended and if the resolutions which were adopted failed to express the gratitude of the plumbers of the Elks it was because of the insufficiency of words and not because the spirit of appreciation was lacking.

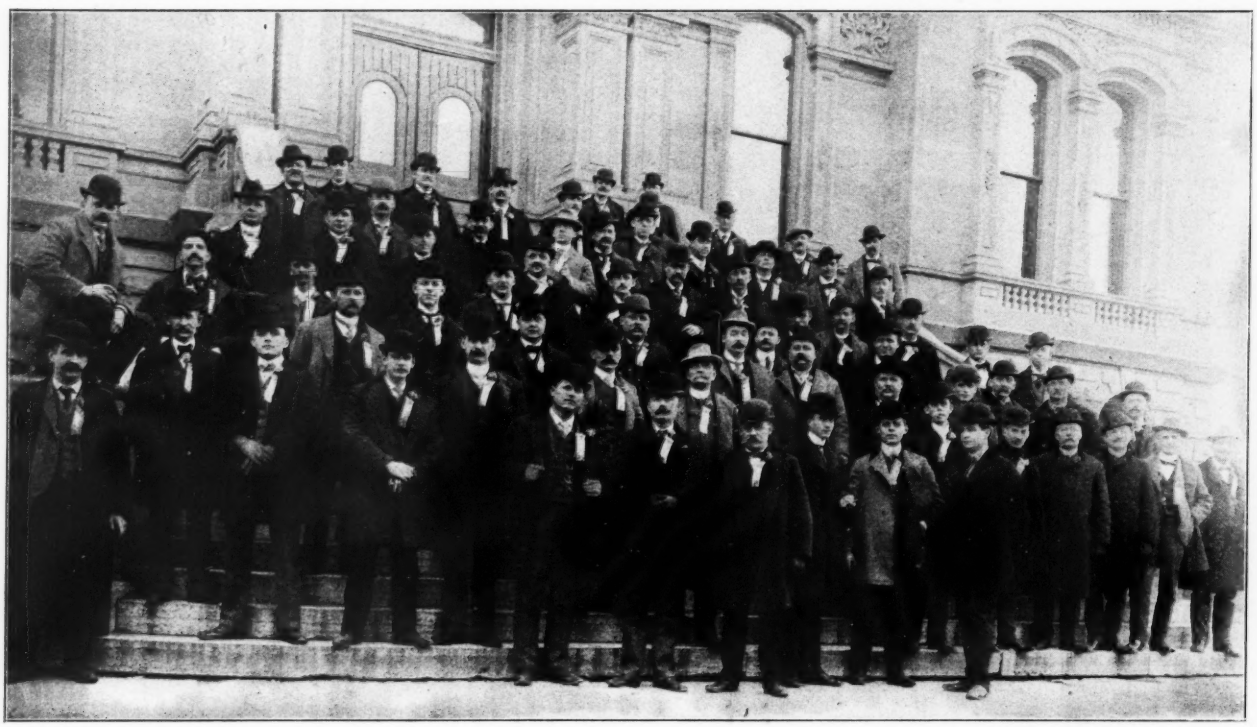
At the opening session the delegates were greeted in a short speech by the president, D. A. Westbury, of South Bend, and given a hearty welcome by H. H. Highlands, of Muncie, on behalf of the local association. Muncie Association has only five firms in its membership but they constituted themselves a committee of the whole to entertain their visiting brothers. Following are the names of the men who did the honors of the occasion: F. M. Stauf, president; R. I. Hoyt, secretary; H. H. Highlands, treasurer; Retherford Bros., and Jones & Clevenger. One of the local plumbers, Jones, of Jones & Clevenger, was appointed sergeant-at-arms because he was young and fleet of foot and so fitted to round up those delegates who were prone to gather in little bunches in some of the many rooms of the club and pursue their fun after the meetings had been called to order. They were few, but they were elusive.

The appointment of a credential committee was the first and last order of business on the morning's program, the following gentlemen being named by the chair: E. A. Strong, of Indianapolis; Emmet Martin, of Ft. Wayne, and Philip stauf, of Muncie.

The afternoon session was of necessity short, the entertainment committee having plans for the afternoon's occupation. The credential committee's report was received and acted upon, the convention extending to visiting members the same rights on the floor as the duly appointed delegates had. In this way a very general expression of opinion was had on all matters coming under discussion.

DELEGATES AND MEMBERS IN ATTENDANCE.

EX-OFFICIO—D. A. Westbury, South Bend, president; Byron E. Hattersley, Ft. Wayne, vice-president; F. J. Zimmerly, Ft. Wayne, secretary; J. C. Jahn, Ft. Wayne, treasurer: Jas. M. Healy and Geo. F. Kirkhoff, Indianapolis; H. H. Highlands, Muncie; W. H. Meerhoff, Richmond; Wm. J. Freaney, Indianapolis; F. L. Marchessau, Elkhart; committeemen.



GROUP OF INDIANA MASTER PLUMBERS AT MUNCIE.

ALEXANDRIA—A. K. Sheffield, the Binkley & Fairfield Co., J. C. Brattain, W. B. Leeson.

ANDERSON—F. C. McCall, Isaac C. May, Powell & Dorste, Daniels & Osborn.

BLOOMINGTON—W. A. Brissenden.

BLUFFTON—Wm. Kerfoot.

BRAZIL—Oscar C. Hawkins.

CRAWFORDSVILLE—Williams Bros., Stephen Miller.

CAMBRIDGE CITY—Wm. H. Kiser & Son.

CONNERSVILLE—G. L. Huxtable.

ELWOOD—Havens & Hodson.

ELKHART—Marchesseau & Taylor, Heffner & Co.

FORT WAYNE—Byron Hattersley, Albert Rolf, Emmett Martin, J. C. John, Robt. Spice, F. J. Zimmerly, C. G. Fox, Martin F. Noll, H. C. Francke, P. F. Vasen.

INDIANAPOLIS—J. W. Marshall, C. Aneshaensel, A. J. Buchner, W. L. Clifford, Jno. C. Dunn, W. J. Freaney, H. A. Goth, B. Gundlefinger, Jos. F. Haslinger, Oscar Herman, J. M. Healy, Geo. F. Kirkhoff, Mock & Cook, Geo. Geis, L.

Pringler, E. A. Strong, Wilcox & Judd, J. Hayes.

LAFAYETTE—Geo. Wallace, E. R. Oberesch.

MUNCIE—Given above.

MARION—R. P. Whistler, M. F. Hagerty, H. W. St. John, S. D. McLain, D. H. Murphy, Jno. McDonnell, L. W. Gillespie.

MARTINSVILLE—Chas. Johnson.

MONTPELIER—C. H. Chaney.

PERU—W. H. Shingler.

RICHMOND—H. W. Meerhoff, W. C. Heiger.

SOUTH BEND—H. P. Blair, Jas. Aslin.

WABASH—W. S. Stitt, T. F. Hipskind.

WARREN—Kerfoot Bros., Clifford Bros.

Part of the afternoon's program was the taking of a group picture on the steps of Muncie's handsome court house. This important event over a trolley train drew up before the court house and the delegates were taken for a ride to the extremes of the city on a tour of inspection. Muncieites are proud of their city and well they may be. It is a compact little city of some twenty thousand inhabitants which has sprung up as a result of the discovery of gas. Its chief industries are iron and steel works and glass factories, of which there are quite a number. The delegates tumbled off at the Whitely Malleable Iron Works and were escorted by the superintendent about the extensive plant, seeing every step in the process of manufacture. They were fortunate enough to arrive at the hour of pouring and a very interesting sight it proved; several hundred men rushing from the furnaces to their moulds with ladles of molten metal resembled so many fireflies in the gloom of the great buildings.

H. H. HIGHLANDS, Muncie, Ind.

A remarkable feature of the Whitely Works is the fact that they have for twelve years been run on an absolutely independent basis without a sign of discontent from their workmen. The management has posted a large sign over the entrance, reading, "Independent Shop. No person will be employed who is a member of the Knights of Labor, or any trades union. Open to independent men only."

At the other end of the city, and reached by a circuitous car ride, is the plant of the Midland Sheet Steel Company, where the delegates were initiated into the mysteries of steel making. Many were the expressions of surprise at the immensity of some of the machines for rolling out the metal, but the thing that proved most fascinating was the annealing oven. It seemed a very demon. The sliding doors closed over it like two great jaws and within the jaws was a heat so intense as to be almost blinding to look at. The plumbers indulged in a good deal of fun over its resemblance to a place which we used to hear a great deal about from the preachers.

In the evening tickets were handed round for the polo game at the Auditorium. The Henleys, of Richmond, and the Royals, of Muncie, are rivals for honors in the state and a good stiff game was promised. Most of the visiting plumbers were not acquainted with the science of the game, but they could appreciate action and they saw plenty of it that night. There was considerable bad feeling between individual players and it found vent in rough handling. The delegates naturally "rooted" for Muncie's team but to no effect, the Richmond team carrying off the palm by a score of five to two.

The chief event of Tuesday morning's session was the president's report, which was a carefully prepared paper of considerable volume, in which he thanked the association for the kind and courteous treatment he had received during his term of office, dealt in detail with the present status of the association, and suggested measures for strengthening it. The state association has been increased by a net gain of twenty-nine new members during his year of office, but the most encouraging feature of the year's work is the growing feeling of solidarity

Pending the report of the executive committee the reports of the sanitary and legislative committees were taken up at the afternoon session.

The sanitary committee, through its chairman, W. H. Meerhoff, of Richmond, submitted the following report, which was accepted and ordered filed:

To the Indiana State Association of Master Plumbers:

Mr. Chairman and Fellow Members—Your sanitary committee beg leave to report as follows:

Nothing worthy of especial mention has come to our notice in the past year in methods or materials for use in sanitary matters. The general tendency, however, indicates a desire for better sanitary goods. In this point we would recommend to the members a closer study of materials and the purchase of goods with the manufacturers' name stamped thereon, which alone will bring the reliable goods to the front and the more redound to the credit of the craft.

To encourage better workmanship we would encourage a general practice of venting fixtures and where possible to effect local regulations concerning same, where conditions permit.

Better goods and better workmanship will bring about better sanitary conditions and success for which we are striving. Respectfully submitted,

W. H. Meerhoff,
Thos. Williams,
J. S. Fulton,
Sanitary Committee.

The report of the legislative committee provoked much useful discussion which will doubtless find future expression in action. The report follows in full:

Report of W. J. Freaney, of Indianapolis, Chairman of the Legislative Committee:

"As Chairman of the committee and living in the City of Indianapolis, the other members of the committee have largely left the matters pertaining to the duties of that committee to me; and upon investigating the probabilities and possibilities of getting a state plumbing law through the legislature, after conversing with a number of the members of the legislature and with officers of the health board, I came to the conclusion, after consultation with the other members of the committee, that it would be inopportune and in fact useless to

R. MILT RETHERFORD, Muncie, Indiana.

try to do anything in the way of securing such legislation at the last session of the legislature.

Two years ago we tried to get a bill through the legislature and succeeded in having it passed in the lower house; at that time we had a representative of our association in the legislature, Mr. Strong, and through his friends, and through friends of the different members of our association at Indianapolis, and also through the friends of the outside members, notably Fort Wayne, Anderson and Muncie, we succeeded in getting that bill passed through the lower house of the assembly. In the Senate the bill was killed, the principal reasons advanced against the adoption of the bill being that there was no demand for such a law, outside of Indianapolis, Ft. Wayne, Muncie and the other towns that I mentioned. The question was put to us, "Have you any local legislation; are there any local ordinances in any of these cities governing the practice of plumbing and have you anything that you can point to as showing the workings of this proposed law that you want us to pass?" We were forced to admit that we had no such local regulations, even in the capital city of the state. Now, with those conditions staring us in the face, your committee came to the conclusion that before we attempted to get any state legislation governing the entire state, it would be proper first to try and do something local in the various cities of the state. With that in view we have been paying some attention to the matter in Indianapolis and there is at the present time an ordinance before the City Council which I think will cover all of the requirements that may be necessary in our case in Indianapolis.

I don't think there is any doubt about it becoming a law in Indianapolis, and if that is the case, I think that the other of the state, notably the larger cities, should follow in our wake and have local legislation, have ordiances passed, if possible, by their councils looking to the betterment of sanitary conditions.

Now, with that explanation, gentlemen, as to what you have to contend with when you go before a legislative body and ask for a measure covering the entire state, you can see what the difficulties were two years ago, and what we would have had to contend with in case we attempted to have such a law passed without first having local legislation in some of the larger cities of the state. It seems to me that this is a very important thing and ought to be followed up. Indiana is today, I believe, the only state in the union, except possibly a southern state that hasn't strict and complete legislation governing the practice and conduct of the plumbing business. I must admit that when we, of Indianapolis, are confronted by people from other states and are asked what our position is in Indianapolis and in this state, we have to hold our heads in shame and admit that we have no ordinances, no rules, no regulations, and that the same thing applies to the whole state of Indiana. That is a condition that ought not to exist; the importance of the matter is far greater to the people of the state of Indiana than it is to a number of other states that are not so densely populated.

"A great many people who are not conversant with the necessities for such laws as I have indicated, immediately think when a matter of this kind is broached to them, that it is some scheme of the plumber to further enhance the value of his business, or, as they put it in the slang phrase, another "graft" of the plumbers to get more money out of the people. Now the public mind should be disabused of that fallacy. Such legislation is not altogether for the benefit of the plumber; incidentally legislation of that kind would benefit the plumbing business, but it is of immeasurably greater benefit to the people of the community which enacts legislation of that character.

"The members of our organization should try to stir up interest in legislation of this kind. If there isn't a city board of health, there is a county board of health, and a little judicious explanation and argument with the health officer of the city or county would readily bring him to understand the necessity for such legislation. The health officers recognize this fact more especially for the reason that they had no legislation governing the practice of their profession until a few years ago, neither did they have any laws governing the practice of pharmancy. It used to be that any one could get into the drug business, prescribe and sell what he pleased, regardless of any regulations as far as the state of Indiana was concerned. During the last session of the legislature previous to the one just adjourned, a law was passed governing the practice of pharmacy. Now pharmacists must undergo an examination as to their ability to practice their profession. The physicians must do the same thing. If we have legislation protecting the practice of medicine and pharmacy, then why can't we get laws protecting the public against incompetent plumbers? As a body we ought to accomplish something. We ought to be up and doing before the next session of the legislature assembles, getting in position to bring influence to bear from every portion of the state, so that we can intelligently convey to the members of the legislature the necessity for such legislation as I indicate. Gentlemen, it seems to me that such a matter as the construction and enforcement of such laws is just about as important a matter as we could consider in an assemblage of this kind. It is the life of our business, and if we don't take an interest in it nobody else will.

"With that explanation as to the difficulties with which we had to contend, I hope you will accept this verbal report from the legislative committee, and take into consideration why it is that we have not anything further to show than the report which I have just made."

Among those who took part in the discussion which followed Mr. Freaney's report were Messrs. Martin, of Ft. Wayne; Meerhoff, of Richmond; Marshall, of Indianapolis; Sheffield, of Alexandria, and Kerfoot, of Bluffton. These all threw some light on the much vexed question, and while no formal resolution was framed the individual delegates

H. A. Goth, Indianapolis.

were charged to do their utmost to educate the authorities in their respective cities as to the importance of a sanitary code.

The report of the exeuctive committee showed good work done by that important body. It's action was for the great part of too special a nature to be given out for publication, but it embodied suggestions and recommendations which were afterwards considered by the convention and formulated in resolutions. One suggestion which met with favor was the more particular definition of the term "Master Plumber." The committee recommended that it be made synonymous with "Merchant Plumber," meaning thereby that a man, to be eligible for membership in the association, must have something more than his kit of tools and a workbench in the wood shed. He must have an established place of business and carry at least a small stock of plumbing goods.

The New York conference resolutions came up for consideration and provoked a very general discussion. Several of the local associations had formulated resolutions asking that the national association take action on the matter at the coming convention in June and the resolution which follows was considered to embody the sense of the convention on the matter. It was adopted by a practically unanimous vote:

Whereas, The New York Conference Resolutions which were adopted at the last convention of the National Association of Master Plumbers, held at Baltimore, have proven to be detrimental instead of beneficial to association members and the trade in general, and

Whereas, We have been by the above resolutions deprived of the protection we did have from the manufacturers and jobbers of plumbing materials, under the present conditions wholesale dealers of plumbing goods being permitted to use their own judgment as to whom they are entitled to sell plumbing goods to, and

Whereas, The manufacturers and jobbers have taken advantage of this state of affairs and have, to our loss, sold plumbing material at wholesale prices to persons not entitled to purchase the same under the terms of the New York Conference Resolutions; be is therefore

Resolved, That we, the Indiana State Association of Master Plumbers, in convention assembled, do deplore the action of the National Association of Master Plumbers at Baltimore in passing the above named resolutions and do earnestly petition of that body that it pass such rules and resolutions at the coming convention at Kansas City as will insure to us proper protection, to which we feel we are justly entitled, in dealing with manufacturers and dealers in plumbing goods.

The election of officers called forth much enthusiasm, the following men being the choice of the delegates, who promised loyal support to their executive staff.

President—H. H. Highlands, Muncie.

Vice-President—L. W. Gillespie, Marion.

Treasurer—R. Milt. Retherford, Muncie.

Secretary—F. W. Stauf, Muncie.

Executive Committee—Jas. M. Healy, Indianapolis; Geo. M. Kirkhoff, Indianapolis; Byron Hattersley, Ft. Wayne.

Delegates to National Convention—W. J. Freaney, Ft. Wayne. Alternates—Emmett Martin, Ft. Wayne; J. M. Healy, Indianapolis.

Sanitary Committee—W. W. Wilcox, Indianapolis; E. A. Westbury, South Bend; F. J. Zimmerly, Ft. Wayne.

Legislative Committee—W. J. Freany, Indianapolis; Chas. Aneshaensel, Indianapolis; Phil Stauf, Muncie.

Apprenticeship Committee—W. H. Meerhoff, Richmond; Robt. Spice, Ft. Wayne; H. Goth, Indianapolis.

Marion had come over loaded for the next convention, and their formidable show of force—seven members out of a possible seven, convinced the other delegates that they had come determined to win, so the favor of entertaining the next convention was handed over as gracefully as possible.

At the close of the executive session many of the members dispersed to their homes, some taking the inter-urban cars and others the railroad trains. Others lingered about the hospitable quarters where they had put in two very pleasant days, and were reluctant to leave when train time came. A sentiment which appeared on a stained glass window in the Elk's lodge room may be taken as the watchword which the Indiana master plumbers will try to live out during the year to come before their next annual convention. It is, "The faults of our brothers we write upon the sands; their virtues upon the tablets of love and memory."

New York State Association of Master Plumbers

Convenes for Thirteenth Annual Session at Syracuse, March 12th and 13th.

IN the history of ancient Syracuse across the sea one of the most prominent figures was Dionysius the Tyrant, but if there were any Dionysiuses of tyrants of any kind in the modern city of that name (and modern and up-to-date it is in every sense of the word) they undoubtedly abdicated in favor of the visiting master plumbers, for the town was unreservedly turned over to them, body, soul and sinews, from its finely-paved, clean-kept streets to the tip-top of the city hall tower, and from East Syracuse to Solway. Rarely indeed have visiting delegates been so well taken care of and their comfort and entertainment so solicitously provided for.

The general committee of the local association having charge of arrangements consisted of B. Joseph O'Donnell, chairman, Cyrus T. Howes, Wm. F. Gooley, C. J. Sullivan and W. L. Smith; the entertainment committee, W. L. Benedict, chairman, Charles F. O'Donnell, F. O. James, F. N. Potter, Irving G. Ward, Jeremiah L. Curran, Charles Ames, W. Goldie, J. E. Maynard, M. L. McGuire, P. J. Dunn, J. Duckrow, M. F. Kennedy and Charles R. Snavely; and the reception committee was composed of Charles A. H. Kienzle, chairman, W. S. Orr, F. W. Waggoner, F. J. Hipkins, F. Soper, M. H. Jalonack, Charles Kieffer, F. Kehoe, Edward Dunkerton, James T. Reid, R. K. Chase, W. A. Boysen, C. J. Straub, Edward Houde, Jr., George Bauer, Edward Eckel, C. L. Mardin, Charles Dussing, F. Groupe and M. J. Mooney.

The salt industry, which first made Syracuse famous, has long ceased to be a leading enterprise, but that her citizens in general and the local association of master plumbers in particular are still the salt of the earth when it comes to hospitality is an assertion that will be enthusiastically endorsed by every delegate and visitor. By Monday night a considerable number of out of town representatives had arrived at the Vanderbilt Hotel, which had been selected as headquarters, notable among whom were strong delegations from Greater New York, Albany and Troy, and they were immediately taken in hand by the reception committee, which, headed by Franklin P. Denison and John McClure Chase, of the R. C. McClure Co., conducted the visitors on a tour of inspection of the fire department, which is the pride of Syracuse.

On the morning of Tuesday, March 12, the delegates marched in a body to Elk's Hall, on South Salina street, with the Greater New York delegation in front, preceded by a large, rich and handsome American flag. When the hall had filled up the platform was occupied by President Horace F.Westcott, of Albany; vice-presidents Charles B. Huck, of Buffalo; secretary John E. Dugan, of Albany, Andrew H. Brown of New York City, and distinguished visitors in the persons of President P. J. Tierney, of the national association, Secretary James C. Conroy and Executive Clerk W. E. Crosby, all of Providence, R. I., and former National President Samuel L. Malcolm of New York.

At 11 o'clock State President Horace F. Westcott arose and called the convention to order and introduced B. Joseph O'Donnell, chairman of the local committee of arrangements. Mr. O'Donnell after a brief welcoming address presented President Westcott with a gavel, the head of which was handsomely carved to represent a salt barrel, emblematic of Syracuse's early manufacturing fame. Attached to the gavel was a bunch of ribbons on which were printed the names of the members of the local association. Mr. O'Donnell admonished the president to preserve the gavel as a memento of the occasion and of Syracuse and to let it descend to his children and children's children. Mr. Westcott expressed his thanks and appreciation and pledged himself to use the emblem worthily, but expressed doubts as to his ability to transmit it to his posterity, as he hasn't even any children yet.

Acting Mayor Martin L. Yann was then introduced and said in substance: "In behalf of the city of Syracuse and of our honored mayor, who is unavoidably absent, I welcome you to the city. We realize that it is an honor to the city to have you with us. We hope that before you go home you will conclude that Syracuse is the only city in which to hold your future conventions. We take a pardonable pride in our city and in the hospitality of its citizens. We have had many conventions of late and we believe that all have been pleased with the welcome accorded them. We hope that you will be as well satisfied.

"We are sorry you have been compelled to come to the city in a season at which the foliage has fallen from the trees in our pretty parks and our popular summer resorts. We invite you, however, to notice our scrupulously clean streets, which are admitted to be the cleanest in the summer time of those in any city of the United States. We invite you, too, to visit our public buildings, our famous public baths and our municipal lodging house. Again in behalf of the city I bid you welcome and extend to you the freedom of Syracuse."

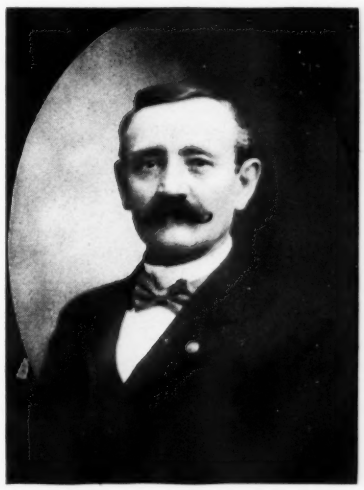
President Westcott responded, referring to the progress of the association during the past thirteen years and to the unusual honor enjoyed by the convention in the presence of National President Tierney and Past-President Malcolm. He then proceeded with his annual address, continuing as follows:

"I am also proud, as no doubt every one of you are, of your membership in the New York State Association of Master Plumbers, an organization which has for the past 13 years been engaged in an effort to give our profession the position in the eyes of the public to which it is justly entitled. Ours is a calling second to none in importance, being recognized by the highest authorities as a leading science and one closely allied to the general welfare of humanity.

"Wherever plumbing is done, human life is at stake. If done properly, well and good. If on the other hand it should be done improperly, there is no computing the damage that may result; therefore, it is the duty of any who are engaged in the business of plumbing or who expect to be, to ascertain whether he is thoroughly fitted, and if not so to take such means as may present themselves to become so.

"We are organized to perfect the sanitary condition of the country, and by doing this we enhance civilization, as must be admitted by the most skeptical, for when individuals become healthier they become better citizens, better fathers and mothers and better associates. To perfect the sanitary condition of our homes is to make better beings of us, and in such work every citizen should unite, whether plumber or shoemaker, and assuredly there is no excuse for a plumber absenting himself from such an important duty.

"Plumbing has ceased to be a luxury for the wealthy to enjoy only; it is now a necessity and as well a work of art and skill, and I believe it may be said without fear of contradiction that it has become the most important branch of the building art and therefore calls for expert consideration. The theory as well as the practical side of the science must



T. McEvoy, Buffalo N. Y.

be thoroughly understood if we expect to succeed, and when I say succeed I do not mean simply financial success, but a far better, a more desirable as well as a more honorable, that is that which will obliterate the greatest amount of vile sanitation. That man only succeeds who does the world some good.

"All these objects are laudable and should engage our united attention, and, besides, these meetings are educating the public to a realization of our importance, and when this is generally understood and appreciated we can hope for a more deserving remuneration for the services rendered. There has been much abuse heaped upon our craft in the past, and while some was deserving much was unjust.

"We already see that people grant that there may be associated honor with plumbing, and it is only a matter of time when the old prejudice will have disappeared forever. The rich plumber may some day become a fact and not a dream or jest, but regardless of this we have a duty to perform and it is to organize and use our united efforts to improve the sanitary conditions of our respective communities. By so doing we will be appreciated at least by the people benefited. There is no excuse why every plumber should not engage in this work and cooperate with us in our efforts, and every enlistment serves to strengthen us that much."

At the conclusion of his address President Westcott appointed Joseph Berla, of Syracuse, sergeant-at-arms, and announced the following committee on credentials: Edward Macdonald, of Brooklyn, William F. Gooley, of Syracuse, William J. Quinn, of Troy, S. H. Barrett, of Auburn, and Charles A. Campbell, of

Watertown. The convention was then adjourned until 2 o'clock.

The afternoon session was opened by the president at 3 o'clock p. m. Upon call the committee on credentials submitted its report which was read and accepted. It included a list showing the numerical strength of each local association, together with the number of delegates to which each is entitled as follows:

Albany, 27 members.....	3	delegates
Amsterdam, 7 members.....	1	"
Auburn, 6 members.....	1	"
Binghamton, 15 members...	2	"
Buffalo, 90 members.....	9	"
Cohoes, 13 members.....	2	"
Dunkirk, 5 members.....	1	"
Geneva, 5 members.....	1	"
Greater New York, 589 mem.	59	"
Ithaca, 5 members.....	1	"
Jamestown, 6 members.....	1	"
Poughkeepsie, 6 members...	1	"
Syracuse, 48 members.....	5	"
Rochester, 42 members.....	5	"
Schenectady, 9 members....	1	"
Troy, 31 members.....	4	"
Utica, 18 members.....	2	"
Watertown, 13 members....	2	"

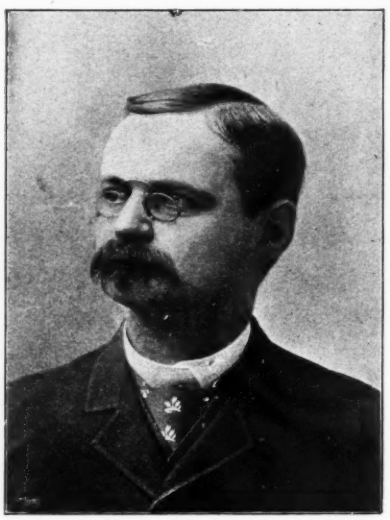
A number of smaller cities and towns contributed special delegations composed of one and two members each, bringing the number up to one hundred and seventeen accredited representatives. The visiting members from the local and out of town associations made a total of more than two hundred master plumbers on the floor. It was decided that the reports of the officers for the past year should be received and referred to executive session for action. Recording and Financial Secretary John E. Dugan of Albany reported the association to be in a more prosperous condition and on a firmer footing than ever before, the total membership having reached a number in excess of 1,200.

Treasurer A. H. Brown of New York reported the financial affairs of the association as in satisfactory shape, the treas-

Wm. J. McDemott, of New York City.

ury holding a balance of nearly two thousand dollars. The president announced the appointment of an auditing committee consisting of J. O. Shumway of New York, J. H. Stygall of Buffalo, and E. V. Cady of Cohoes. Also a committe on resolutions composed of W. J. McDermott of New York, T. E. Kerwin of Albany, A. A. Dumond of Rochester, P. H. Carney of Utica, and Wm. R. Stevenson of Schenectady. An invitation from the Pierce, Butler & Pierce Mfg. Co. to visit their boiler and radiator plant was read and placed on file.

A number of resolutions submitted by various associations and individuals were read. One was that the transportation committee shall arrange thirty days before each convention with the railroads for special rates of fare. Another was for an amendment to Article 6 of the Constitution providing that the local associations pay in their per capita tax in semi-annual installments, the first half on or before January first, and the second half on or before July first. A res-



Charles Geiger, of Buffalo.

olution from Utica provided that any master plumber violating the rules of his local association shall stand suspended pending action on the case. This was referred to the committee on resolutions. Mr. Malcolm of New York moved that committee on resolutions report to executive session. A discussion followed, participated in by Mr. McDermott and Mr. Rossman of New York, Mr. Tobin of Syracuse and Mr. Geiger of Buffalo, the motion finally being carried.

State Vice-president to the National Association, J. A. Rossman of New York, handed in his report amid applause, and it was read by Treasurer Brown. It recommended the substitution of the New York conference resolutions and was accepted and filed. B. F. Donohue of the legislative committee, J. H. Stygall of the sanitary committee and Wm. C. Vrooman of the apprenticeship committee made short reports. Mr. Donohue submitted a letter from his committee addressed to R. W. De Forest, chairman of the state tenement house commission, suggesting methods of correcting evils in the sanitary condition of tenements and other similar buildings. The communication states that many owners and agents allow janitors and other incompetent people to do repair work which should be done by regular plumbers. In many cases it was found that leaks in water and gas pipes had been stopped by soap, putty or rags. The suggestion is that any such or similar repairing be made a misdemeanor, and that it shall be unlawful for any real estate owners or agents to allow any one but a licensed plumber or a competent employe of a master plumber to perform any such work. These contemplated enactments are intended to apply to cities of the first-class; many desire to have cities of the second class included in their provisions. Mr. Barnes of Troy made a few remarks on the workings of the White charter in cities of the second class. In Troy he said the mayor was disregarding the provisions of the charter by permitting the inspector to issue permits for tapping mains to irresponsible persons. In Albany he had heard a carpenter had been appointed as a plumbing inspector.

Wm. C. Vrooman of Schenectady called attention to a bill before the Legislature providing for taking the appointment of the secretary of the plumbing board from that body and placing it in the hands of the common council, which would pave the way for the appointment of incompetent men and political workers.

The convention then went into executive session, which continued until time for adjournment. In the evening the delegates and other visitors were entertained by a stag smoker at the large new hall and bowling alleys at Long Branch on the Lakeside trolley line. The building is situated on the north side of Lake Onondaga, near its outlet. Bowling was freely indulged in and in the big hall above the following musical and literary program was carried out:

MUSICAL PROGRAM.

(Under direction of Prof. G. J. Kresser).

1. "I don't love you no more, nigger."
Mr. John H. Gillroy, of the R. C. McClure Co.
2. "Kentucky Babe." DeKoven Quartet.
Messrs. Hertz, Mulherin, Murphy and Hassett.
3. Bass Solo—"Asthere."
Mr Thomas Burns, with Edward Joy.
4. Tenor Solo—"The Holy City."
Mr. Bernard Murphy.
5. Recitations—Mr. Will Fournier.
A—"Casey at the Bat."
B—"The Story of Winning Cup."
6. Bass Solo—"Off to Philadelphia."
Mr. Hugh Mulherin.
7. Shakesperian Recitation—
"The Fall of Woolsley."
Mr. Jeremiah L. Curran of the Syracuse M. P. A.
8. Tenor Solo—"Lovely Marie."
Mr. Andrew Hertz.
9. "Serenade"—DeKoven Quartet.

Wm. G. Reid, of Rochester.

One of the most important pieces of business transacted at the second day's morning session was an enactment increasing the amount of the per capita tax from one dollar to one dollar and a quarter.

A resolution was introduced by Mr. Barrett of Auburn, to bring the matter of the conspiracy indictment against the Rochester plumbers before the convention in open meeting for investigation. On motion of Mr. Dumond of Rochester this resolution was referred to the executive committee of the incoming admin-

istration with full power to act. After adjournment for the noon recess the officers, delegates, visitors and representatives of the press marched in a body to the city hall, in front of which a group photograph was taken.

At the opening of the afternoon session it was announced that practically all of the resolutions introduced on the previous day had been adopted in executive session.

Secretary Dugan called attention to two bills now before the state legislature regarding which he thought the convention should take definite action.

The sense of the convention was opposed to the Kelsey bill concerning examining boards, and in favor of the Ross bill requiring that on contracts for public work the plumbing and other features of the work should be bid on and awarded separately. Mr. Shumway of New York, chairman of the auditing committee, announced the accounts of all officers to be correct.

The convention then proceeded to the election of officers, Messrs. Hanchett of Syracuse and Moran of Albany acting as tellers. Mr. Malcolm, of New York, in a telling speech, nominated for the office of president Charles B. Huck, of Buffalo. The nomination was seconded in eulogistic terms by Mr. Comber, of Buffalo. Upon motion the secretary was instructed to cast one ballot, representing the vote of the convention, for Mr. Huck, and that gentleman was escorted to the rostrum amid great enthusiasm, where he thanked the convention in a characteristic speech. Each of the other officers was elected unanimously as follows:

Vice-president, B. F. Donohue of New York; secretary, H. J. Wood of Buffalo; treasurer, A. H. Brown of New York; delegates-at-large, W. H. Barnes of Troy and P. H. Carney of Utica; delegates to national convention, Horace T. Westcott of Albany; Charles Geiger of Buffalo, and President Huck, ex-officio; national state vice-president, John E. Dugan of Albany.

On motion of Mr. Reid of Rochester a vote of thanks was extended to the local association, the citizens of Syracuse and the local and trade press.

The business of the convention wound up with the selection of a meeting place for the next annual convention. New York and Albany were named, and Mr. Reid of Rochester made a strong plea for Elmira, taking the very sensible view that policy should prompt the selection of a city where association missionary work is most needed. He was warmly seconded by Mr. Geiger of Buffalo and Mr. Malcolm of New York, and Mr. Kerwin of Albany concurred in their view by gracefully withdrawing the name of that city, upon which Elmira was made the unanimous choice of the convention. A motion was then made and carried for the adjournment of what was doubtless the largest and most successful convention in the history of the New York state organization.

The crowning feature of the meeting was a magnificent banquet in the spacious dining hall of the Vanderbilt Hotel, at which a number of prominent citizens were invited guests. The brilliantly lighted hall was filled with a concourse of between three and four hundred, throughout which prevailed a spirit of harmony, congeniality and enjoyment. Inspiring music was furnished by Kapp's Orchestra and the Mozart Male Quartet.

President Willlam F. Gooley of the Syracuse association acted as toastmaster. The toast "Our City," was responded to by Francis E. Bacon, president of the chamber of commerce.

Newly-elected President Charles B. Huck's response to "Association" was inspiring and permeated by his usual rich vein of humor. Next came "Woman and Liberty," by Dr. J. W. Knapp, and "City Water Works," by Col. John G. Butler. William P. Baker of the Syracuse Herald, spoke in a felicitous manner on "The Press and the Plumber," and Philip M. Beecher of the Pierce, Butler & Pierce Mfg. Co., made a palpable hit in his talk on "The Trade." Hon Michael E. Driscoll brought down the house by hin inimitable dissertation on "The Landlord and the Plumber," and the large throng marched out singing "America" to the accompaniment of the orchestra.

Convention Notes.

The Buffalo delegation brought a supply of Pan-American badges in several handsome designs, which were in great demand.

It was a great gathering of fine-looking people, but the consensus of opinion was that Charley Kienzle was the handsomest man at the convention.

It was worth the trip to see Joe Corkery do the cake walk on the tiled floor of the Vanderbilt lobby.

Much regret was expressed that President Geo. W. Smyth, of the Brooklyn branch, and chairman of the delegation, was prevented from coming by the death of his brother, John Smyth, who was for a long time with the H. B. Claflin Co.

John A. Murray, the popular New York convention and was kept busy shaking jobber, was a prominent figure at the hands with his friends, who are legion.

Ex-President Howard F. Westcott retires after three years' of faithful and arduous service. Treasurer Andrew H. Brown begins his fourth term in that office.

Among the numerous traveling men in attendance were Theo. W. Starbuck, with the W. C. Vosburg Mfg. Co. of Brooklyn; Murray G. Millikin, eastern representative of the H. Mueller Mfg. Co. of Decatur, Ill., and Francis N. Hoeffer, with the John Douglass Co., of Cincinnati.

In the lobby of the convention hall hall Arthur H. Marscher of the new Syracuse Faucet and Valve Co., conducted a practical demonstration of the merits of their improved no-packing, reversible basin cock. It was the verdict of all who examined it that it is far in advance of any other faucet made. Warren S. Purrington is president and treasurer of this company, and Arthur H. Marscher vice-president and secretary. They also manufacture bibbs, ball cocks and other plumbers' supplies in that line made on the same principle.

New England News.

Plenty of Work.

Springfield, Mass., March 27.—(From a Staff Correspondent.)—Whitcomb, Kirkham & Gray, the popular plumbers and heating contractors of this city, have been unusually busy this year. They have the installation of heating for a twelve-room school on William street, also an eight-room school in Ludlow, as well as the overhauling of the heating system in George B. Holbrook's home, Maple street.

A Wonderful Gain.

Boston, Mass., March 25.—(From a Staff Correspondent.)—Blake & Andros, the popular manufacturers of this city, are having an enormous sale of their B. & A. elbow valves, which find many customers in nearly all the large supply houses from the Atlantic to the Pacific. The demand for these highly polished, standard made goods has been phenomenal since January 1st, and indicates that the trade appreciates a first-class article at a low price.

Plumbers Meet in Holyoke.

Holyoke, Mass., March 25.—The master plumbers of central and western Massachusetts met at Hotel Hamilton Wednesday last.

There were about forty present from cities and towns in this vicinity. The gathering was entirely formal and was only one of many held at the call of the officers of the New England Plumbers' Association during the year in various places in the state.

That meeting opened with a banquet, which was served in Landlord Bowker's best style at 1 o'clock.

After the edibles had been disposed of and cigars lighted, those present spent the balance of the afternoon in discussing various matters of interest to their particular line of business.

Business Rushing.

Boston, Mass., March 25.—(From a Staff Correspondent.)—The Weld Manufacturing Co., agents and manufacturers of the Davis & Roesch Temperature Controlling Company, who are located at 41 Lincoln street, this city, with factory at Bridgeport, Conn., report business exceedingly good. They have been very busy this year putting in the D. & R. system of heat controlling, having just finished placing two of them for Harvard University, one for Yale College, one large one for the city of Boston, and one for a large shore mansion. They report the D. & R. vacuum air valve as making good headway in the market, as well as their low price pressure damper regulator and reducing valves. The D. & R. hot water regulator accurately controls the temperature of hot water, and is finding a ready sale.

District Meeting at Fitchburg.

Fitchburg, Mass., March 20.—The New England Master Plumbers' Association held a district meeting here to-day, the session being at the Fitchburg hotel. About 50 delegates were present out of a membership of 500. The places represented were South Framingham, Worcester, Hudson, Marlboro, Clinton, Orange, Gardner, Baldwinville, Leominster, Nashua, N. H., and this city.

Pres. Herbert E. Jennison, of this city, presided, and the record of the meeting was made by Sec. Charles H. Brown, of Worcester. Dinner was served at 1:30. Both before and after dinner business was in order, the topics being general in character, concerned plumbing laws, legislation, labor questions and improved methods of carrying on business. The proceedings were quite informal.

John F. Bresnahan, inspector of plumbing, was present as a guest, and among the speakers was Vice-President C. P. Brennan, of Providence.

County Meeting.

Pittsfield, Mass., March 18.—A meeting of the master plumbers of Berkshire county was held at the American House in Pittsfield Thursday evening, when President Jennison, of the Massachusetts Plumbing Association, spoke in reference to promoting more unity among the plumbers of the state by dividing the territory into districts with meetings to be held about once in three months. The attendance was not nearly as large as

was expected, owing to the prevalence of grip among those invited. About 15 master plumbers, mostly from north Berkshire, were in attendance; only three Pittsfield men being present. Those present were: H. E. Jameson, of Fitchburg; G. A. Bidwell, W. G. Backus and D. W. Bovette, of Pittsfield; E. E. Ford, of Dalton; M. A. Loftus, F. A. Secor, C. F. Lucey, Arthur C. Porter, A. W. Hunter, C. C. Sherman, of this city, B. H. Sherman, of Williamstown; L. B. Parker, Dalton; L. A. Weston, of Adams.

IN ELEGANT QUARTERS.

Springfield, Mass., March 27.—(From a Staff Correspondent.)—The Hitchcock Supply Co. of this city are about settled in their new quarters, 72-74 Dwight street. They have four stories and basement in which to display their goods. The store is 40x80 feet, and the basement will be utilized for soil pipe and wrought iron fittings. On the first floor they have elaborately arranged offices, with a few display bath rooms uniquely finished, with tanks, etc., in working order, the first of the kind in this section of New England. The rear is used for a shipping room. The second floor is used for brass goods and steam fittings. Boiler and earthenware will occupy the third floor, and upon the fourth floor will be found bath tubs, wash trays and general goods. Hydraulic elevators are in place, and each room and floor is connected with telephones. In a word, the Hitchcock Supply Co. now has quarters thoroughly modern in every respect.

NEW HAVEN'S BUSY SEASON.

New Haven, Conn., March 24.—The "Commercial Record" prints the accompanying table which shows that in point of building investments the season of 1901 will be one of the biggest in New Haven's history. It is a long time since so many notable buildings were under construction or projected at one time and the year will be a banner one in that respect. The table includes only buildings costing $10,000 or over, and those under way at this time or which will be placed under contract within a short time. Following is the list:

Yale Bi-centennial Buildings	$1,000,000
Y. M. C. A. Building	225,000
Malley Building	150,000
New High School Building	250,000
Cedar Street School Building	45,000
Yale Medical School Buildings	100,000
Yale Administration Building	60,000
Public Baths and Wharf	28,000
Benton-Armstrong Factory	20,000
National Wire Co. Factory	100,000
Strouse-Adler Factory	25,000
Armour Meat House	35,000
Kent Laboratory Addition	35,000
C. H. Miller Building	12,000
Prof. T. S. Woolsey, Residence	15,000
L. Simons, Residence	21,000
Lewis S. Welch, Residence	10,000
Dr. Williston Walker, Residence	12,000
Dr. John S. Ely, Residence	15,000
J. D. Duff, Residence	10,000
	$2,618,000

MOTHER'S CLUB AGITATES VENTILATION.

New Bedford, Mass., March 20.—At a meeting of the city council last night Alderman Brownell, the chairman, read a communication from the State Inspector of Factories and Public Buildings, notifying the council that additional means of ventilation must be provided in the Parker street school, by means of brick or metallic flues or ducts aided by heat or mechanical means, to supply to each person accommoadted therein at least 30 cubic feet per minute of properly warmed fresh air, to properly circulate such amount of air in the rooms and remove it therefrom in a proper manner when it becomes vitiated.

It is understood that the condition of the building was called to the attention of the inspector by the Parker street Mother's Club.

Mayor Ashley, who was present at the meeting, announced that he intended to ask the entire city council to meet some morning this week or next, to accompany him on a tour of inspection, visiting both the High school and the Parker street school buildings.

FOR PLUMBING REGULATION.

Boston, Masssachusetts, March 25th—Senator Currier's bill, which provides for the regulation of plumbing by the state board of health and for uniform laws governing the same, was favorably reported yesterday. Senator Currier's bill seems to meet with favor from his fellow legislators. Following are Sections 1 and 2, which provide for state supervision:

"Section 1. The state board of health shall prescribe rules and regulations for the materials, construction, alteration and inspection of all pipes, tanks, faucets, valves and other fixtures by and through which waste water or sewerage is used and carried, and provide that no such pipes, tanks, faucets, valves or other fixtures shall be placed in any building in any city or town of 5,000 inhabitants, or more, in this commonwealth, or any town having a system of water supply or sewerage, except in accordance with such rules and regulations, and in accordance with plans in conformance with said rules and regulations, which shall be approved by the board of health of such city or town, or such person or persons as such board of health may designate. Nor shall any plumbing work be done, except in the repairs of leaks, without a permit being first issued therefor upon such terms and conditions as such city or town shall prescribe.

Section 2. No city or town, except the city of Boston, shall by ordinance or by-laws, or otherwise, require or prescribe any rules or regulations for the materials, construction, alteration, and inspection of pipes, tanks, faucets, valves and other fixtures referred to in section six inconsistent with, or in addition to, the rules and regulations prescribed by the state board of health."

This bill is attracting much attention in different cities and towns and there is much opposition to the idea of having the state board of health take the supervision of plumbing from the local boards of health

The American Architect and Building News, of March 9, referring to changes proposed in existing laws, says:

"The requirement that each house shall have a main trap is antiquated, and, indeed, as we understand, is feebly enforced, the health authorities of the city, like those of other cities, finding that the advantages of freer ventilation of the sewers far outweigh any possible protection given by the trap, and the repeal of this provision of the existing law is desirable in every way. Another request of the petition, that traps on rain-water conductors may be made discretionary, is commented on very sensibly by the legislative committee, which observes that conductors opening within four feet of a window should certainly be disconnected from the sewer by a trap, while others, as, for example, those discharging water from a flat roof, not only need no trap, but, without one, assists materially in the ventilation of the sewers. Another section of the petition repeals the requirement that traps shall be backvented, only stipulating that they shall be protected against loss of seal. As every architect knows, this may be accomplished in many ways better than by the expensive and objectionable backventing, and no one interested in the progress of the art of plumbing would be sorry to see this part of the petition favorably received."

AS OTHERS SEE US.

The Iowa Health Bulletin, a bright little paper published in the interests of the Iowa health board, has the following to say about "Domestic Engineering": "We are greatly indebted to 'Domestic Engineering' for the entire use of the article on 'Earth Closets for Use Where Sewers Are Not Built,' and for the cut illustrating it. We have frequent inquiries for such information, and we believe the reprint referred to above will be found practical and very helpful. 'Domestic Engineering' is published in Chicago and New York and we find in it a great deal of useful, interesting and instructive information."

Middle States.

PROSPECTS GOOD.

Detroit, Mich., March 31.—(From a Staff Correspondent.)—In a recent interview with your correspondent, S. H. Morgan, former secretary of the Michigan M. P. A., and delegate-elect to the convention of the National Association, was inclined to take a hopeful view of the prospects for building activities this spring. He says he has already booked more work than he usually has on hand by June 1st. Besides the plumbing in twenty houses, he has the heating of an engine house for the fire department, and the plumbing and heating of the new Avenue Theater, on Woodward avenue.

The Detroit Association recently entertained the Windsor Master Plumbers in their commodious rooms on Grand River avenue. After a short business meeting the two associations went into social session and discussed in an informal way topics of mutual interest. The Windsor brethren were found to be quite equal to every occasion, whether it was at repartee, business suggestions, or the punch bowl, which was strictly up to date as to shape and contents. Local talent had been engaged to make the evening one of jollity as well as profit, and the Windsor boys are said to be still "talking it over."

TAKES PRIDE IN HIS WORK.

Richmond, Ind., March 18.—(From a Staff Correspondent.)—In a recent interview with your correspondent, Mr. H. Meerhoff, of this place, spoke of the pleasure he has had in his work on the Children's Home at Eaton. Aside from the fact that the contract was a large one—$1,600 for the heating and $1,800 for the plumbing—it has been a satisfaction to put in good work on it, as first-class goods only were specified. He made use of Wolff's fixtures for the most part.

NEW LOCATION.

Peoria, Ill., March 18.—Mr. W. W. Murphy, the plumber, has moved from his old place of business on Harrison street to 430 Main street. The move was made in order that more convenient quarters nearer the center of trade might be had. The present store is probably the lightest and best arranged for the showing of plumbers' supplies and sundries to be found in the city. Mr. Murphy is a progressive citizen whose fourteen years in business for himself have been characterized by a constant commercial growth,

and his many friends will be glad to congratulate him on moving into such a desirable, new mercantile nome.

GOODMAN'S STOCK DESTROYED.

Milwaukee, Wis., March 25.—(From a Staff Correspondent.)—The entire stock of gas and electric fixtures and plumbing goods belonging to W. E. Goodman, treasurer of the National Association of Master Plumbers, was destroyed Friday night by the fire which started in the Rohfling music store and which destroyed over $400,000 worth of property before it was controlled. Mr. Goodman's stock, which was valued at over $20,000, was fully insured, and he reports that he will be able to resume business again at once at the old stand, 442-444 E. Water street.

TALKS SENSIBLY.

Joliet, Ill., March 18.—The Daily "News" has the following editorial in regard to the proposed plumbing ordinance: "The question of sanitary plumbing and drainage cannot be given too much study. Nothing has more to do with the health of the community. A careless or ignorant workman can very easily plunge a whole household into sickness, and cause much misery, to say nothing of the expense. It pays to have good plumbing. Science has made many strides in the disposal of sewage, and the city which neglects to enforce the best possible rules in this direction is criminally negligent. The measure now pending may or may not embrace all the proper safeguards, but it is the duty of the council to determine this and then act accordingly. The city that possesses and enforces a stringent plumbing law, and provides an adequate system of sewage, with an abundance of pure water, will come very near to being a clean, healthy city."

AGED PLUMBER COMMITS SUICIDE.

Detroit, Mich., March 24.—The dead body of Gustav A. Thalman of 439 Chene street was discovered at noon to-day suspended from a rafter in an attic room.

Coroner Forth cut the body down and ordered an inquest to be held Thursday the past few weeks with pneumonia and the consequent complications and was very despondent. The position of the body showed that he had made his way alone into the attic, placed a rope tied carefully around his neck, stood on a chair and fastened the rope over a rafter above him, then jumped from the chair.

His absence was discovered by a daughter, Rosa. The relatives allowed the body to remain till the coroner came. The condition of the body showed that the man had been dead about an hour.

Thalman was 59 years of gae and had lived at the residence where the tragedy occurred fully 20 years. He was a plumber and for years had been employed by T. Schmidt & Sons.

Mr. Thalman was highly respected and was well known, especially among the members of the A. O. U. W., in which he was active. Six children, two sons and four daughters, survive.

Southern Notes.

WILL BUILD AN EXCHANGE.

Wheeling, W. Va., March 26.—A meeting has been called at which all the builders, building supply men, architects and others interested are asked to meet, to be held Friday night, to take steps for reorganization of the Builders' Exchange. The outlook for building was never so good in Wheeling as this spring. Already over a million dollars' worth of work is under contract or ready for bids. lighting. He will use L. Wolf's plumbing fixtures throughout.

GOOD CONTRACTS.

Baltimore, Md., March 25.—(From a Staff Correspondent.)—The William Groscup Co., the heating and sanitary plumbing engineers, at St. Paul and 26th streets, have secured the contract for heating and ventilating the Southern Homeopathic College on North Mount street, this city, which is being constructed by E. M. Noel, the builder, and also the contract for making a steel stack to be used in the residence of Dr. Carter, at Calvert and 29th streets.

INDORSE NEW SEWAGE SYSTEM.

Baltimore, Md., March 15.—At the third annual meeting and banquet of the Master Plumbers' Association, held last week, the following officers were elected for the ensuing year: President, D. A. McAllister; vice-president, George J. Thaler; secretary, Charles Wagner; treasurer, H. J. Reinhart.

In the speeches at the banquet the proposed new sewerage system was endorsed. Among the speakers were John A. Wilson, Philip Lenderking and George J. Thaler.

AGAIN THE DEADLY TORCH.

Florence, Tenn., March 10.—Albert Murdock, a clerk for W. V. Roesch, a plumber, was badly burned in the face this afternoon by the explosion of a gasoline buzzing furnace. Fortunately, help was at hand, and the flames were extinguished without any damage. The boy's face was badly burned and he had a very close call. He would have been burned to death in another half minute, as he was blinded by the flames and burning gasoline, which was all over his head and face.

MORE WORK THAN THEY CAN DO.

Bellaire, W. Va., March 25.—Plumbers are reaping a harvest from the present building boom, and are almost getting more work than they can handle, and have orders piled up and waiting. In several instances work on buildings has been delayed through the inability to secure plumbers to put in the gas, water and drainage pipes, which are put in before floors are put down. Bellaire has but three establishments, Fitton & Co., Porterfield Bros. and R. Johnson, all of whom have extra men at work.

NEW PLUMBING RULES.

Wilmington, Del., March 12.—The plumbing rules and regulations of the city are to be changed. At the meeting of the Street and Sewer Department, this morning, President Simmons gave notice of a series of amendments to the existing regulations, which will probably be read at the next meeting. The object is to insure better sanitary sewer connections and some of the changes have been requested by plumbers and drain layers of the city.

Plumbers and drain layers' licenses for the year 1901 were granted to L. K. Guthrie and A. L. Sharpe.

FROM OUR GEORGIA CORRESPONDENT.

Atlanta, Ga., March 25.—The outlook for plumbing and heating for year of 1901 is very promising. Already many smaller jobs have been begun and several large ones in prospect. The architects report that up to date they have more work than during the entire year of 1900.

The Century Building Co. have applied for charter; capital stock already paid in, $200,000. They already have plans for a large building, cor. Whitehall and Ada streets, to be called Central Bank Block. Will probably cost $200,000.

Plans are out by J. H. Dinwiddie, architect, for Peters building, which will be a six-story building fronting Peachtree street, between Decatur and Wall streets. Probable cost, $125,000.

BATHTUBS ARE NECESSITIES.

Washington, D. C., March 23.—The district commissioners, upon the recommendation of the inspector of plumbing, Mr. Charles F. Ball, have denied the request of Mr. James F. Barbour that in the erection of four small brick houses in square 260 he be relieved from the necessity of putting in bathtubs, as required by the building regulations of the district. Mr. Barbour stated that the houses are calculated for a cheap class of tenants, who would probably not appreciate nor use bathtubs.

The regulation requiring bathtubs, says Mr. Ball, was carefully considered by the plumbing board, and it is believed to be fully justified by the conditions under which such brick dwellings are constructed in Washington.

"Perhaps," he stated, "one of the points which should be brought to the minds of the commissioners in connection with this case is the fact that our city is absolutely without public bath houses, which have been found necessary in most large cities. An additional argument for the requirement suggested is the relatively low water rate, making the expense for the use of such a fixture very much less than in many cities."

THE STANDARD RAISED.

Baltimore, Md., March 13.—The State Plumbing Board has re-elected Mr. John Trainor president, and Mr. Charles H. Frederick, clerk. Yesterday the board began the annual examination of plumbers prior to issuing the certificates on May 1. The standard has been raised and President Trainor said yesterday that the plumbing laws would be rigidly enforced this year. There are, he says, between 600 and 700 plumbers in Baltimore, whereas only about 400 have up to the present time complied with the law. The remainder have been doing what Mr. Trainor terms a "speak-easy" business, which the board proposes to break up at once. After May 1 every plumber who is found working without a certificate will be prosecuted.

Ten applicants were examined yesterday. Hereafter, before securing a certificate, journeymen plumbers will be required to make an average of 60, instead of 50, as heretofore. The average for master plumbers has been raised to 80, from 70. Examinations will be held at the City Hall Annex every Tuesday afternoon until May 1. The board is composed as follows: John Trainor, president; Health Commissioner Bosley, secretary; Mr. P. T. Barry and Mr. H. C. Bowman. Mr. J. B. Noel Wyatt was appointed on the board by Governor Smith, but declined. His successor has not been named as yet.

Notes from the West.

H. W. HOWARD DISAPPEARS.

Dubuque, Ia., March 18.—H. B. Howard, superintendent of the plumbers' work in the annex to the government building in this city, has mysteriously disappeared. His home was Lincoln, Neb., and he was employed by the Corsmeyer Company, of that city. Wednesday morning his roommate found a note from Howard in which he stated he was going away and would probably never be seen on earth again.

FIVE PASS.

Davenport, Ia., March 12.—The newly appointed board of examiners under the board of health rules held its first examination of journeymen plumbers, Saturday afternoon. Five men were examined and passed with marks above 70 per cent, the mark required by the rules, and were therefore given certificates as journeymen.

The board is composed of the following members, who are named by the board of health:

Dr. C. H. Preston, physician to the board of health; Thomas Murray, city engineer; E. M. Dalzell, plumbing inspector; ex-Plumbing Inspector Rudolph Kahles and Robert Clayton.

The class examined Saturday by the board was composed of the following plumbers:

C. A. Nutting and Frank Yerbury, of Rock Island, and George Burke, William Tiedermann and Rudolph Kahles of this city.

Another class will be examined next Saturday afternoon. The examinations meet with the approval of the plumbers of this city. They are as deeply interested in raising the standard of work in this city to the very highest, as are the contractors and builders and householders.

This law has been in force since 1893 but up to the present time there have not been regular examinations in the strictest sense of the word. From this time on, however, it is promised that nothing will be overlooked.

IS UP-TO-DATE.

The Clinton (Ia.) "Herald" published in a recent number the following description of an up-to-date plumbing shop:

Woodbury's plumbing shop, located on Fifth avenue, is by far the best and most complete plumbing, steam and gas fitting establishment in the state of Iowa. The building is located at No. 139 Fifth avenue, is 120 feet long, and the entire first floor and basement are filled with goods. The basement contains a complete assortment of cast-iron and enameled sinks, galvanized iron range boilers, black and galvanized water and gas pipe, soil pipe and fittings, mineral wool, asbestos, cements, etc.

The shop is located in the rear part of the first floor and is well lighted; is 60x25 feet, and contains a most complete stock of malleable, galvanized and cast-iron fittings, from ⅛ in. to 6 in. Over 500 different kinds; the most extensive stock in the city. Here also is being installed a large pipe-cutting machine, which weighs two tons, and will cut all sizes of pipe, from one to four inches. A large assortment of emery grinders, powder drills, polishers and a five-horse power electric motor, which will furnish the power for operating the machines.

The front room in the building is devoted to office purposes, and in the room between the office and the shop in the rear will be found a general stock of plumbing goods, such as standard porcelain and enameled bath tubs, ranging in size from 4 feet to 5½ feet; enameled lavatories, marble wash stands, slate and enameled sinks and instantaneous water heaters.

In this department is a complete line of electric goods, dry batteries, Edison Lelande batteries, bells, etc. Also supplies of all kinds for gasoline launches, engine trimmings and steam and hydraulic packings; steam valves, water meters, gas fixtures, incandescent gas lights and supplies.

Kinks from Kansas City.

By Dent Yates.

Kansas City, Mo., March 21. 1901.

Kansas City has been fortunate in having good men as plumbing inspectors and Ed. Blanchard, our present official, upholds the standard of his predecessors in good shape. There is but little delay in getting the work inspected when the notices are sent in. Either Ed. or his first lieutenant, Miles Bulger, appear on the scene. They size up the job with their eagle eye and it is either a case of dump the stack and make it right or else O. K. and go ahead. But Ed. is up against the real thing now. We had a little bunch of smallpox here and a new pest house has just been rushed to completion, and Jimmie Wirthman got the job of plumbing. Quite a lot of the boys figured it and Fred Hacker was among the number. Ed. Blanchard went out and inspected the job and suggested some alterations and Jimmie Wirthman started to make them, when just about that time the city physician concluded he needed the new pest house, so he rushed in fifteen or twenty of the fiercest cases of smallpox that ever bloomed in the spring, and the plumbers threw up both hands and fled. Ed. says he is too busy to go down there and rubberneck at that job for final inspection. Miles Bulger says he is, too. Fred Hacker says Jimmie Wirthman didn't comply with the specifications. Jimmie says he is a Missourian and wants to be shown where he didn't. In the meantime the smallpox is working overtime and Ed. Blanchard is looking for a first-class immune. It's a sad, sad story, Jack.

Last winter was a tough proposition on the Kansas City plumbers and heating men. The early part of the season it looked as though we would cut a little ice, and I told some of my customers that I feared there would be some busted pipes, but it proved to be a vain hope. The weather didn't get cold enough to try out the hot water and steam jobs even. And the cheap steam fitter who put in half enough radiators to warm up his job received just as much credit and made more money than the conscientious man who figured glass exposure and zero weather. However, it won't be that way every year. If it was we would all have to learn the ice machine business.

Steam fitters, both masters and journeymen, seem to be losing ground every year. The engineers of all the big buildings nowadays have a complete outfit of pipe cutting tools and not only do their own repairing but they even ignore the poor boss altogether, and go out and employ such mechanics as they can find and fit up new jobs. The steam fitters seem to have no control in the matter of hours or wages, while they are acting as renegades and working for engineers or hotels, but the instant they start a job for a master fitter, presto change! It is nothing but full wages and eight hours. The most contemptible trick I have had played on me was a case where a fellow who called himself a fitter started to work for me on a contract I had in a box factory. He drew his $3.50 for eight hours, quit at the stroke of five and forgot to get to the job till 8:10. I did a little extra work for the box man, and when this was done I laid Mr. Fitter off, as he didn't seem to be over-anxious to work. On the first of the month I presented my bill to the box man for the contract, and an extra bill of a few dollars' worth of material, and five days' fitter and help at $6.50 per day. "What!" said the box man; "$6.50 per day for that man; why, he is working here now fitting up a dry kiln for $2.75." Now, how do you suppose I settled that bill? Thank goodness, there are not many like that fellow!

The Coast Trade.

DOING SOME GOOD WORK.

Baker City, Ore., March 25.—(From a Staff Correspondent.)—C. R. Whitman has just finished the Baker Opera House job, which consisted of plumbing and gas-fitting, about 3,500 feet of pipe being used in the gas service, which is quite complicated. It is so arranged that the lights in all parts of the house can be controlled from the stage. This is said to be about as good an opera house as can be found on the Pacific coast outside of San Francisco. He has also just completed the new Masonic Temple in tin roof, plumbing and lighting. While this is not a large lodge building, nor a very expensive one, it is conceded to be the best arranged Masonic temple on the coast.

The work contemplated for the season is the building of a five-story hotel, a hospital by the Sisters of St. Francis, and a few two and three-story business houses and residences.

SAN FRANCISCO NOTES.

San Francisco, Cal., March 13.—(From a Staff Correspondent.)—Wm. Mooser & Son, of this city, were the successful competitors in the architectural competition for the Martinez court house and jail. There will be considerable plumbing in this.

It is probable that a million dollar hotel building will be erected by the guardians of the minor children of the late Chas. F. Crocker, who are the owners of the property formerly occupied by the Calvary Church. The plumbing will be up-to-date.

The Callaghan Estate Co. have given the plumbing on their new building, now in course of construction, to Jas. E. Britt, for $7,297.

The Geo. H. Tay Co. will do the heating in same building for $5,080.

Wm. F. Wilson signed up a contract for the plumbing in a nice residence for $1,541. Also another contract for a family hotel for $4,331.

Wm. S. Snook & Son will receive $1,197 for plumbing a residence.

Chas. Rehn signs a contract for $1,250.

J. C. Lawson also gets a $1,571 contract.

The Geo. H. Tay Co. will do the heating in the new chapel and reading room at the Presidio.

The Mutual Savings Bank is now excavating for their new bank building on Market street. This building promises to be an ornament among the many magnificent buildings now on this thoroughfare.

JOURNEYMEN LOSE STRIKE.

Colorado Springs, Col., March 12.—(From a Staff Correspondent.)—The journeymen plumbers lost their strike, and after being out for two weeks have gone back to work for four dollars a day, which was the pay before the strike, the master plumbers refusing to grant their demand for five dollars per day.

The journeymen plumbers will work under the following rules, called by the master plumbers.

The Ten Commandments.

Sec. 1.—Each man must treat our customers with politeness and respect.

Sec. 2.—A day's work shall consist of eight (8) hours; 8 to 12 o'clock a. m.; 1 to 5 o'clock p. m.

Sec. 3.—Every man must be on his work at eight (8) o'clock sharp. Should he need any material that he can carry, he must be at the shop in time to get same material, and be on his work by eight (8) o'clock. Should he want more material than he can carry he must report at the shop the evening before, after 5 o'clock, with a list of the same material, which will be sent him the next morning.

Sec. 4.—That each shop be allowed one apprentice: Same to serve two (2) years, and at the expiration of that time be called a junior, and to receive two ($2) dollars per day; and at three and one-half (3½) years he shall receive full plumber's wages.

Sec. 5.—No car fare will be allowed, except on jobbing.

Sec. 6.—The shop or machine man not to be under the jurisdiction of the Plumbers' or Steamfitters' Unions.

Sec. 7.—At any time that a steamfitter and helper may need more help to handle radiators or large pipe, he must use helpers.

Sec. 8.—Any plumber or fitter not doing first-class work, and should said work have to be done over, it must be done at his expense.

Sec. 9.—We reserve the right to sell goods to anyone we see fit.

Sec. 10.—Each man must report his time at the shop every evening.

Miscellaneous Items.

To Promote Publicity.

Believing firmly in the value of advertising and realizing what a difficult matter it is for the business man who has not made a special study of the subject to put his advertising matter into the best shape to obtain results, "Domestic Engineering" has had prepared by an expert ad writer a series of advertisements designed to relieve the retail plumber of

PLUMBING
promptly perfected
When you want a Plumber
You want him at once.
Then you want him to do a good job and get out of the way.
That's Our Style.
J. Morton & Co., Plumbers
CHICAGO.

131

the necessity for agitating his gray matter in an attempt to think up a clever and effective ad for his local paper.

PRACTICAL PLUMBERS PROMOTE PIETY
by removing one excuse for profanity. Our work is the right kind, and we charge no more for good work than you may have been paying for a "lick and a promise." :: :: :: ::
JOHN MORRIS CO., Plumbers
....PHILADELPHIA, PA.

132

For seventy-five cents we will send you a reproduction of any one of the advertisements shown on this page, substituting your name and address for the fictitious ones given. These cuts are made by the electrotype process, securely mounted on wooden blocks and ready for insertion in the columns of your local paper without further thought on your part.

As variety is the spice of advertising, as well as of life, and as frequent changes of advertising matter are necessary in order to attract attention, we would suggest that you order two or more cuts and have them appear alternately.

QUICKNESS AND QUALITY
Characterize our work.
If you need a plumber
Don't wait till to-morrow
Send for us at once.
Don't Worry about the price
HAMILL & WATERS
Sanitary Plumbers - Hammond, Ind.

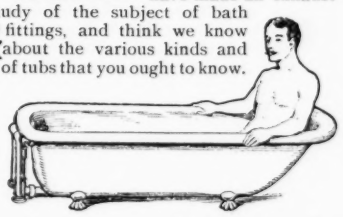
133

Be sure, when ordering, to write your name and address plainly and to specify the number of the cut or cuts you wish.

To Officers and Members of Kindred Organizations.

Greeting:—The Association of Master Plumbers of St. Louis at its regular meeting of March 19, 1901, tendered a unanimous endorsement to Mr. Jno. J. Foy for the position of chief of plumbing on the St. Louis World's Fair buildings. He is a thoroughly representative plumber of high ability in both mechanical and executive capacity and possesses the confidence and esteem of the men engaged in the various branches of the plumbing business in St. Louis.

When You Need a Bath Tub you need us. We have made an exhaustive study of the subject of bath room fittings, and think we know a lot about the various kinds and styles of tubs that you ought to know.



John Rowe, - Morristown, Pa.

134

We believe he will fulfill the duties of this position in a manner reflecting credit, not only on himself, but upon the trade and organization he represents. We would be pleased to have your endorsement.

Fraternally yours,
E. A. Brandt, Chairman.
Philip Schmidt, Secretary.

Committee: Jas. Fitzgerald, chairman; John Gilmore, secretary; Fred Abel, Henry Whitney, W. J. Johnston, John F. Reardon, Jos. F. Tumalty, Richard J. Crane.

Address John Gilmore, secretary of committee, 1810 Lynch street, St. Louis, Mo.

John Campbell, Scottish American.

On page 35, of this issue, we show a full-length likeness of John Campbell, of Paterson, N. J., in full Highland costume. Mr. Campbell is a prominent member of the Master Plumbers' Association of New Jersey, having been its president and having also served as state vice-president of the National Association. He sails on June 22 to visit his native land, after an absence of fifteen years, going this time to represent various Scottish fraternities, of which he is an officer. He is president of Branch No. 2 of the Scottish-American Glasgow Exhibition Society of 1901, chief of Paterson Caledonian club (second term), and chairman of the Scottish Societies of Passaic County. Before his return he will make an extensive tour of the British isles and spend some time on the continent.

Where Is Jos. Kubec?

W. M. Kubec, of the Des Moines Plumbing Co., Des Moines, Ia., is much worried about his brother, Joseph, who left Des Moines on the night of Saturday, March 9th. Young Kubec is 22 years of age, five feet eight inches tall, and of light complexion. It is believed that he will call upon the plumbing trade in some city, and anyone hearing of or seeing him will confer a favor by telling his brother of his whereabouts.

PLUMBING
Properly Performed
JOHN DOE
Plumber
Brooklyn, - New York
at Proper Prices

135

A Tale with a Moral.

Once upon a time a tramp was sorely in need of something to eat, and, approaching a farm house, he spake unto the farmer, saying: "If you will give me the wherewithal to satisfy the cravings of the inner man, I will kill all the rats about the place."

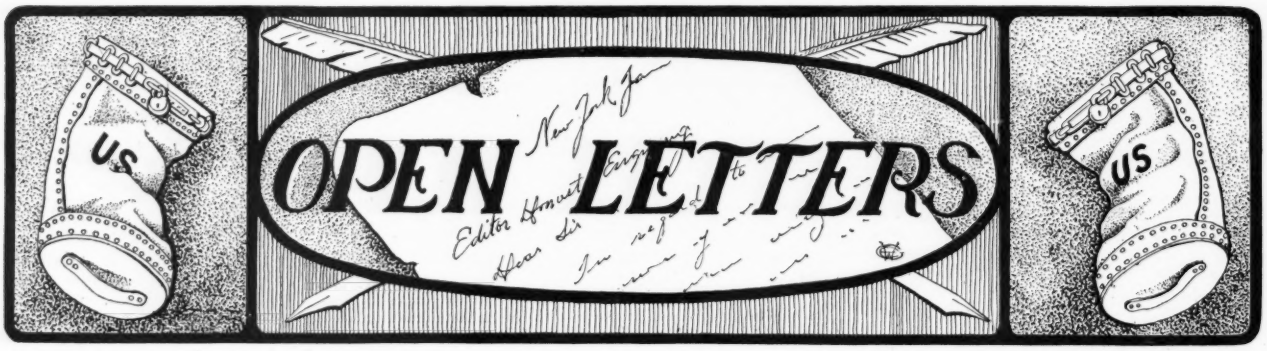
"Agreed," said the tiller of the soil, and he ordered his good wife to give the tramp a square meal.

After the tramp had devoured everything in sight he went to the wood-pile and selected a stout club; then seating himself on the porch, he said to the farmer, "Now bring on your rats."

Moral—Always have the details specified in the contract.

We take a pardonable pride in proving the perfection of our
Plumbing
If you want any kind of a plumbing job done
If you want the best
If you want it quickly
If you want right prices
Come to Us.
J. R. COOMBS & CO., Plumbers
CHICAGO

136



TAKES EXCEPTION TO MR. PUTNAM'S ARTICLE.

To the Editor "Domestic Engineering":

Dear Sir—In your issue of Feb. 15 there appears an article under the head of "Plumbing and Household Sanitation," by J. Pickering Putnam, of Boston, Mass., with a few illustrations showing the proper as well as the improper manner in which work should be done. I am surprised not only in seeing your paper, claiming, as it does, to be the leading paper in the world as regards sanitary matters, but more so at any man of reputation, claiming to have any knowledge of sanitation, in permitting such an article to appear above his name.

As an apology for not writing you sooner on the subject I will say that the article in question only came to my notice quite recently, and as a sanitarian I could not let the matter go unchallenged. Mr. Putnam in his Fig. 53 shows a system of plumbing, drainage and ventilation which he designates as "complex" and in vogue at the present day. I will not dwell on the correctness of this cut at this time, as that is not the question at issue, but rather that of his Fig. 54, which he holds is simpler, better, and one which he advises the substitution of for Fig. 53. Now, in the first instance, the gentleman insists that the present system as described in Fig. 53 is complicated, unnecessary, almost idiotic, being founded and carried on by prejudice, ignorance and humbug, and that it increases the material cost of a building two or three times as much as his own original system that originated—where? Well, I will leave that for others to discover. He says that the complicated system makes it impossible for a prospective purchaser to determine whether a house is properly plumbed or not. How many men, either prospective purchasers or architects, deliverers of lectures, or even writers for sanitary magazines, could look at the plumbing in a house that was not constructed under the supervision of one competent to judge or one guided by proper sanitary laws, and tell whether such plumbing is sanitary or not, except men who have had the proper training in this particular line? The gentleman dwells at considerable length on the purity of our sewers by reason of the ventilating of same every twenty or thirty feet through the house stack.

He hoots at the idea of a house-trap and in a very able manner explains how the amount of soil-pipe in an ordinary building would average about one hundred feet; he also makes it clear that the amount of decomposing matter contained in this soil-pipe is ten times greater than that of the thirteen feet of tile connecting the building with the main sewer, and in almost the same breath shouts "Down with the 'back vent'!" and advises you to connect the various fixtures in this same building to a stack of soil-pipe that is so arranged as to act as a rain conductor. He does not realize that every time there is a sudden downpour of rain, that nearly, if not every one of the traps in the building will be siphoned in practically the same manner as he portrays later in his argument in Fig. 57.

If siphonage is not to be considered and economy is such a factor why not cut out and do away with the trap entirely and give the sweet, pure, germless sewer free access to the habitation of man? I dare say that if such a condition prevailed in the sleeping apartment of my learned friend from Boston it would not be long before he would seek other quarters.

Now, in the face of these conditions that he has brought about he attacks what he terms the "monster back vent" and designates it not only as an ancient, expensive, useless, and altogether unnecessary arrangement, but he insists that it is positively criminal in this enlightened age. In the course of his remarks he alludes to it as a thirsty dog that will, if left on guard over us, be certain in time to lick the water seal out of our traps, or else by gorging itself with grease at one end or with snow at the other, lose all consciousness and abandon the trap seal altogether to its enemies.

Let us concede, for the sake of making the argument plain, that the back vent is constructed of lead, and in case it should be necessary to connect it to soil-pipe stack. By the use of an inverted Y, with the stack properly increased to provide for additional fixtures, height, etc., I defy Mr. Putnam to estimate or even guess the length of time it would necessarily take for this back vent to fill up.

Inasmuch as the gentleman has not confined his remarks to the ventilation of sinks, although he lays considerable stress on grease, I will not enter into a detailed argument at this time how even sink traps may be safely ventilated, but for the sake of further argument we will presume that the back air ventilation is constructed of galvanized iron or soil-pipe, and that it did not stop up after being in use for a number of years, and when in all probability the plumbing fixtures in the building had either outlived their usefulness or passed out of style. Tell me how we could be any worse off in that event than we would be if, as he advocates, there were no back vents at all. Again, he mentions the possibility of snow stopping up the vent. I dare say that even Mr. Putnam will agree with me that if the vents are the proper size, carried up in a sanitary manner and sufficiently increased at the juncture of the roof, no trouble will ever be experienced.

Once more it is asserted that, even though the vent-pipe remain open and free from stoppage, it will cause the seal of trap to evaporate. Compare the probability of this with the action of a heated room on a fixture which would necessarily have to be in either supposed case unused for a considerable length of time, or, what is even worse, in a case where there is no back vent and during the time consumed in the process of evaporation not only the probability but the absolute certainty of the seal becoming polluted and emitting an odor equally as strong as if there were no seal at all, unless, perchance, the sewer in question might happen to be one of those well-ventilated, odorless affairs heretofore mentioned by my friend.

My contention is that if the back vent was clear and open through the roof, not only would there be no chance of pollution, but absolutely none from evaporation either.

Even though Mr. Putnam had succeeded in securing a foundation for his argument against the back vent, his arrangement of the bath and basin in Fig. 54 operates directly against his theory, inasmuch as they are both situated so far from trap that there must necessarily be a considerable accumulation of filth between fixture and trap.

I will not comment further, unless it is to say that I trust that architects and other persons with no greater knowledge of house plumbing, drainage and ventilation than is manifested by the author of the article I have seen fit to attack, will consider seriously his method of doing plumbing.

G. A. Griswold,
President State Board Plumbing Examiners, Denver, Colo.

ANSWER.

We are pleased to receive and publish this communication from President Griswold as it gives us an opportunity to define our position on this and kindred subjects. We feel that we should fail of our mission as a representative trade journal did we not give space in our columns for all shades of opinion on plumbing problems. To this end the columns of "Domestic Engineering" are always open to anyone who may wish to discuss opinions expressed in our columns, provided always that such discussion shall be conducted in a gentlemanly manner and copy accompanied by the name of writer. Anonymous letters are always consigned to the waste basket.

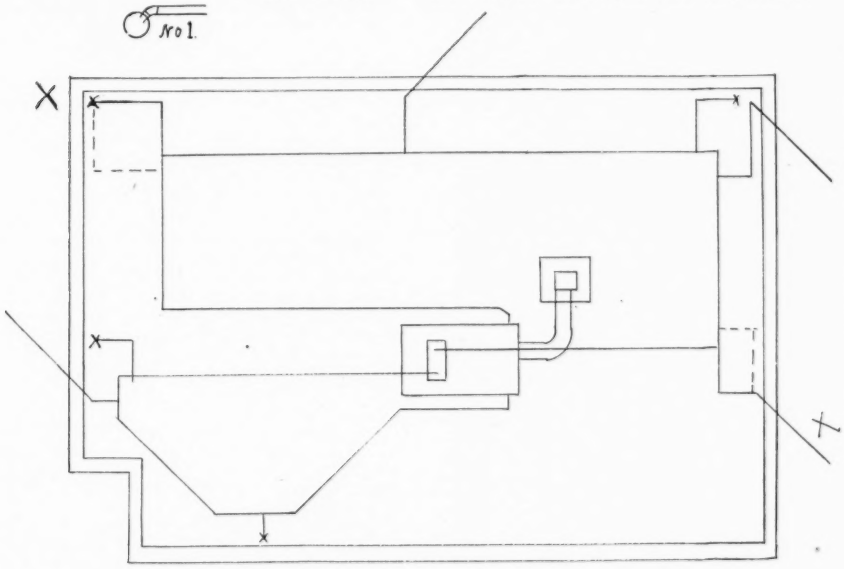
In reference to the instance at hand, we would further say that while not committing ourselves of all of Mr. Putnam's theories, we believe that we are rendering a distinct service to the advancement of sanitary science in publishing this series of articles. It is a mistake to think that sanitary engineers have attained to all knowledge that may

be gained in that science, and while Mr. Putnam's theories may be proven to be incorrect, we give him credit for sincere conviction. Moreover, the theories of today are the acknowledged facts of tomorrow, and while not recommending the abolishment of the system of back ventilation without the most thorough investigation of all arguments for and against it, we would bespeak for Mr. Putnam's theories the careful consideration of all parties interested. If you have a word to say for or against these theories, let us hear from you in the open letter department of "Domestic Engineering."

RADIATORS DO NOT HEAT.

Pekin, Ill., Feb. 2, 1901. To the Editor of "Domestic Engineering," Sir: Enclosed you will please find a sketch of a steam heating job which was done here in town and which has given trouble in the two radiators marked (X) on the sketch enclosed. If you have time to look into this matter and will let me know, or publish, the best way to remedy this trouble, you will confer a great favor upon the Pekin plumbing shops, as they are in dispute about it. Yours for success,

Carl Lucas.



ANSWER.

The dotted line on the above sketch will show the solution of the problem; by doing away with bull-head tees and using tees and arms for branches as shown in sketch No. 1. A further criticism can be made about the size of the pipe used. In the center of each run an eccentric reducer is used reducing the 2 in. main to an 1½ in. This is a bad thing to do as the two-inch (2 in.) main should be carried past the last radiator always and then reduced. We feel confident the above suggestion will prove valuable.

THE QUALITY OF SOLDER.

Oswego, N. Y.—To the Editor of "Domestic Engineering": Sir—Is there any rule which you can give us as to how we can tell good plumbers' solder?

ANSWER.

Heat the solder about the same as for making a joint, and pour out a little, about the size of a silver dollar, onto a cold but dry stone. If, when cold, the piece looks white on both sides, or has a few small bright spots on the under side only, it is too coarse and requires more tin; if it has several small spots on both sides, the proportions of lead and tin may be about right, but joints made with this solder will sometimes "sweat," the tin will also keep running, and the plumber is troubled by it sticking to his cloth. This solder should be used at as low a degree of heat as possible.

If the small cake has three or four bright spots on the surface, and on turning it over it shows about twice that number, or is bright nearly all over, the solder will be found to be very good, and will work very well indeed. If there are too many spots the solder is too fine, and should have more lead added. On no account should solder ever be heated to redness.

GASOLINE AND ITS DANGERS.

St. Paul, Minn.—To the Editor of "Domestic Engineering":

Sir: Will you have the kindness to print in your paper for the benefit of the master plumbers, who are now beginning to sell the various makes of gasoline incandescent lamps, which are now on the market, some statement which will show the dangers and proper care of gasoline?

ANSWER.

We take great pleasure in reproducing from the bulletin of the Iowa State Board of Health the following on this topic:

GASOLINE AND ITS DANGERS.

First—Keep it in a well ventilated, cool place, inaccessible to children, never in any part of a dwelling.

Second—No unclosed vessel, as a pitcher, basin, or cup, containing gasoline, should be carried or placed within ten feet of a burning stove, lamp, gas or flame or any kind, nor left standing in any room within a dwelling house.

Third—Gasoline should never be poured from one vessel to another in any room in which there is a lighted lamp of a burning gas jet, an open grate burning, or within ten feet of a stove in which there is a fire, as the current or air in a room is always toward a fire or a burning lamp, and the vapor of gasoline will be carried in that direction and will ignite at a long distance.

Fourth—It is dangerous to fill the reservoir of a stove when the burner is lighted, or near another stove in which a fire is burning. When not in use, close the cut-off between the reservoir and burner. This will prevent overflow from defect or leakage at the burner. If there be an overflow of gasoline when filling the reservoir, or from the burner, wipe it carefully up before lighting the burner. If the overflow should become ignited smother it with a blanket or cloths. Do not throw water on it, as that spreads the gasoline and increases the danger. Flour will quelch the flames quickly. This is true of the accidental ignition of any quantity of gasoline or kerosene. Keep the reservoir continually closed air tight.

Fifth—If from leakage of a stove or vessel there is discovered an odor of gasoline in a room that has been closed, throw open the doors and windows until the air is changed before a match is struck, or a flame of any kind is permitted therein.

Sixth—Never kindle a fire with gasoline.

Seventh—Keep gasoline in a tight vessel, and after drawing therefrom place the cap over the spout and close the neck and vent-tube if there be one. This will prevent evaporation of the fluid. It is from evaporation, filling the air with an explosive vapor, comes the danger.

Eighth—Never attempt to clean gloves on the hand nor dresses with gasoline, near a flame or stove. The fire from the stove will draw the vapor from the gasoline through the crevices, and ignite it like a lightning flash. If gasoline is spilled upon your clothing remove the garment at once, keeping entirely away from flame of any kind. The deodorizing of gasoline for toilet use does not change its explosive nature.

MAKING CALKED JOINTS.

Sacramento, Cal.—To the Editor of "Domestic Engineering": Sir—We would like to know how much lead we should figure will be required in making joints in cast iron water mains.

ANSWER.

The following table will be a good guide for you to go by to determine the materials which will be used in making joints in cast iron pipes of the various diameters given:

Diam. of Pipe. in inches.	Weight of Lead. lbs.	Length of Yarn. ft.
3	2½	4½
4	4	5
5	5	6½
6	6½	7½
7	7¾	8½
9	10½	10½
12	19	15

FLAW IN DRAIN PIPES.

Jacksonville, Fla.—To the Editor of "Domestic Engineering": Sir—What is the velocity of floor through drain pipes with different gradients?

ANSWER.

The following table will give you the information you desire. We also publish in addition thereto a rule for finding out the desired fall for drains:

Diam. of pipe in inches.	Fall.	Velocity in feet per minute.
4	1 in 40	278
6	1 in 60	278
8	1 in 80	278
9	1 in 90	279
10	1 in 100	279

Multiply the diameter of the pipe in inches by 10. This will give the length in feet, which should have one foot fall.

Example:

3″x10—30′ run for 1 ft. fall or 1 in 30.
4″x10—40′ run for 1 ft. fall or 1 in 40.
6″x10—60′ run for 1 ft. fall or 1 in 60.

Taking Zinc from Solder.

Jackson, Mich.—To the Editor of "Domestic Engineering": Sir—Can you tell how to take zinc from solder?

Answer.

Put the pot of poisoned solder on the fire, and when just melted remove the pot and stir into the solder a good handful of common sulphur or powdered brimstone, until the mass is of the consistency of wet sand; replace the pot on the fire and melt the contents, taking care not to make them too hot. As the solder melts the sulphur will rise to the top, bringing the zinc with it; the crust should then be carefully removed, in one piece if possible, and the solder will be found fit for use.

Joining Lead and Iron Pipe.

Birmingham, Ala.—To the Editor.

Sir: Why is it desirable to use ferrules between lead and iron pipes?

Lead and iron can never be relied upon to form a perfect joint for various reasons, the most important one of which is the difference in the expansion and contraction of the two metals, which cause them to part or become faulty at the connection. Hence the use of the ferrule, which consists of an iron socket with a lead covering fixed very securely around it by compression. Other ferrules are made of brass with a socket head to receive the iron pipe into it and the other end tinned to be wiped onto the lead pipe. The connection between lead and iron pipes is of the utmost importance, and must be carefully and honestly made.

What Causes Water Hammering?

Rahway, N. J.—To the Editor of "Domestic Engineering": Sir—Will you have the kindness to explain water hammering in pipes?

Answer.

A leading plumber has written this on the subject of water hammering in pipes:

"If it were possible to have a tube with sealed ends, a small quantity of water in it, but all the air exhausted, the tube being placed upright and then quickly reversed, the water would fall to the lower end and make a noise which has been compared to that of a hammer when used. Water falling in a vacuum meets with no resistance, as it would when falling through air, until it comes into contact with a solid body sufficiently rigid to check its forward movement, and the noise proceeds from the point or space of impact between the water and resisting body. When water is flowing through a pipe and is suddenly checked, the same noise proceeds from the knocking of the water against the end of the pipe or whatever is placed as a barrier to stop the flow. The noise is heard at every point of the pipe throughout its length, but not always at the same instant of time. In the case of a long length of service pipe the noises appear to repeat very quickly, so that the water hammer then is known as 'chattering.'

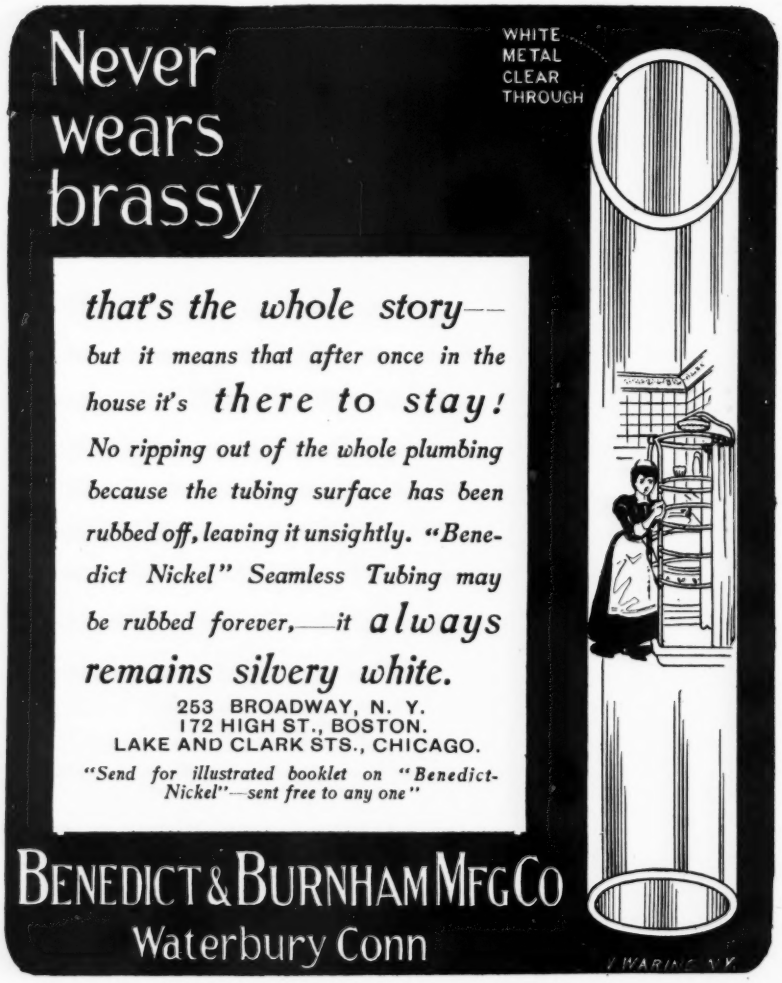
"Length of pipe has a great deal to do with the noise, that is, the longer the pipe the greater the noise. Position of pipes appears to have very little effect, although the noises made by horizontal pipes with a low water pressure are sometimes louder than those from vertical pipes supplied from a higher head. A pipe from a cistern fixed a few feet above a floor can be fixed beneath the floor and connected to a cock over a sink a considerable distance away, and water hammer is still found to occur, although the noise is muffled to a certain extent. When inspecting houses the writer frequently makes use of this noise to enable him to trace the runs of the service pipes, and also to distinguish them from each other.

"Another point worth mentioning is that when the service pipe and cock are of the same nominal size the noise is greater than when the pipe is largest. This is owing to the water traveling at a lower rate of speed in the larger pipe and, consequently, is not checked in the same manner as with the smaller pipe.

"With common bib-cocks the noise almost invariably occurs owing to the sudden stoppage of the flow of water when the cock is quickly turned. The noise is very rarely heard when valves are used. These valves close very slowly, and thus gradually check the flow of water instead of doing so suddenly. Hence these valves are frequently used instead of cocks to prevent noises in the pipes. It may be here mentioned that this kind of valve has a slow thread on the spindle; so that it cannot be closed suddenly. There are several makers who have valves with quick threads. These are generally known as 'half-turn,' 'quarter-turn,' etc.. Such valves can be closed as quickly as ordinary cocks and thus produce water hammer, but the noise is not so great with valves owing to the seatings being made of India rubber, or other material which is not so hard and rigid as the key of a cock. These valves will not resist such a great water pressure as those with the slow threaded spindles, hence their suitability for low pressure only. Even in the latter case when two valves have been used on the same service-pipe, the rebound of water caused by the sudden closing of one valve has forced the other one partially open. In such cases it is usual to screw the stuffing box so tight as to grip the spindle and trust to the friction to keep it from turning.

"We have now dealt with the causes of noises and alluded to two mechanical means for stopping them, namely, the slowly closing valves and those with the valves sliding past the inlet. These two methods are those mostly practiced, but they cannot be accepted as being entirely satisfactory; and neither would it be wise to entirely trust to them. Not only is the sound of water hammer objectionable, but the force engendered is frequently sufficient to burst the pipes or break any delicately made parts of valves or fittings in connection with them.

"The simplest way for explaining the amount of force expended on the insides of pipes, by water hammer, is to first refer to the method in mechanics by which work the effect of force is measured. What is known as a 'foot pound' is generally accepted as the unit of measurement. In our case, this would mean the amount of force represented by one pound falling from a height of 1 ft. in a given time, this being known as 'one foot pound.' Ten pounds falling from a height of 1 ft. would be called ten foot pounds, and one pound falling a vertical distance of 10 ft. would also be called ten foot pounds, and so on for other weights and heights. To apply this rule to our ques-


Never wears brassy
WHITE METAL CLEAR THROUGH
that's the whole story—
but it means that after once in the house it's there to stay!
No ripping out of the whole plumbing because the tubing surface has been rubbed off, leaving it unsightly. "Benedict Nickel" Seamless Tubing may be rubbed forever,—it always remains silvery white.
253 BROADWAY, N. Y.
172 HIGH ST., BOSTON.
LAKE AND CLARK STS., CHICAGO.
"Send for illustrated booklet on "Benedict-Nickel"—sent free to any one"
BENEDICT & BURNHAM MFG CO
Waterbury Conn

tion we can assume that a pipe is filled with water from a cistern or reservoir 10 ft. above the lowest end. We know that the pressure of water, under ordinary conditions, in any vessel, is equal to .4335 lbs. per square inch of surface for each foot of head. From a cistern, the surface of the water in which is 10 ft. above it, the pressure on the end of the pipe would be 4.335 lbs. on each square inch of surface. But this is simply 'dead weight' of water, and we should have to multiply it by the distance the water has fallen to find the momentum and from that the bursting force expended inside the pipe when the momentum is checked. Those who know the action of a hydraulic ram will better understand this when they are reminded that with a head of 1 ft., sufficient power is exerted to force a portion of the same water to a height of 8 ft. to 10 ft. above the machine, and with a height of 10 ft. of driving head water can be raised 80 ft. to 100 ft. One ram in the market is advertised that it will raise water thirty times higher than the fall or head of water above it. The successful working of a ram depends amongst other things, on the suddenness with which the momentum of the water is checked. This causes violent water hammer, which is not only heard at the ram but also at the extremity of the drive-pipe in the reservoir, which may be 100 yards away. But for the air vessel on the ram the noise caused by water hammer would be heard at the end of the delivery pipe, even if in a house a mile away from the ram. This noise is a frequent cause of complaint and invariably takes place when the air has been exhausted and the air vessel has become water-logged or filled with water. The action of a ram will be explained at a future time; it has only been referred to here to more clearly explain the root of our subject. With a knowledge of the causes we can now proceed to deal with the remedies. Slowly closing valves for this have already been referred to, and also valves with elastic seatings. Before dealing with the next remedy it will be necessary to refer to atmospheric air.

"Atmospheric air always occupies a certain amount of space, and this space depends, amongst other things, on the position of it with regard to the earth's surface, that is, the air near the earth occupies less space than an equal amount would at any height above. Air near the earth is compressed by that above it, this pressure being generally accepted as being 15 lbs. (more exactly 14.7 lbs.) on each square inch of surface. This pressure is exerted not only downwards, but upwards and sideways, at the same level to the same extent. This is sometimes called a pressure of one atmosphere. Not only can air be compressed, but by mechanism it can be made to return to the same density at the earth's surface as it has some considerable distance above it. If a quantity of air was enclosed in a tube made as in Fig. 1, the two ends being left open, the atmosphere would press downwards, as shown by the arrows, equally, and the air inside the tube would be of the same density as that outside. If a tightly fitting piston was pushed down one of the legs the air would still occupy the same amount of space, only that a portion of it would be pushed out of the tube. But if we were to first seal up the open end of the tube, and make it air tight, then push down the piston in the other leg, the contained air would be compressed and occupy a lesser space. The amount of this space would depend upon the amount of power expended on the piston. That is, if a pressure equal to 15 lbs. on a square inch of surface was applied to the end of the piston the air inside the tube would be made to occupy about half the space it did, and would then be considered as being under two atmospheres of pressure. If the piston was held down by means of a weight, immediately the latter was removed, the piston would be forced upwards. This would arise from the expansive force of air in returning to its ordinary bulk. Air can be made less dense and to occupy a larger space than it generally does by simply enclosing a portion of it and removing all external pressure. To make this clear, we will assume an India rubber bag filled with a small quantity of air. If this were placed in the glass receiver of an air pump, and the air then pumped out of the receiver, the India

Fig. 1.

ruber bag would be found to grow larger and larger as the air inside became expanded through no longer being subjected to external pressure from the atmosphere. Unless the bag was a very strong one it would keep on expanding until it burst by the internal pressure of the air. If, instead of going to this extreme, air was let into the receiver, the India rubber bag would at once return to its original size and condition. Thus showing that the air above us is an elastic fluid, which can be compressed into a lesser space or expanded so as to fill a larger one. To do either of these, a certain amount of force is necessary, but immediately the force is removed the air will return to its ordinary condition.

"These properties of air are made use of by engineers in a great many forms, and, amongst the rest, to prevent water hammer in pipes, etc. Bib valves have been made with hollow spindles, the hollow being filled with air, which is pent up and cannot escape. On closing the valve suddenly the water knocks against the air in the spindle; this acts as a pad or cushion to deaden the noise, and also to gradually check the velocity of the water. It is doubtful if this valve is a thorough success, the amount of confined air being so very small.

"Any flexible kind of ball filled with air and placed, and kept, in the proper position inside a service pipe will act as a buffer for water to knock against. The ball is not recommended, owing to the material of which it is made being liable to corrosion, so that after a time it would be useless. Spring buffers have been suggested for use, but all machinery is bound to break down sooner or later, and neither can any really good substitute be found for air.

"Referring again to Fig. 1, and assuming that the end a is airtight, and b is continued to a cistern some distance above, filled with water, the air in a would be compressed in the same manner as when the piston was used. If a bib-cock was branched in as shown by the dart at c, and this cock was opened, the water that was in the leg a would immediately fall to a lower level and, in some cases, disappear, if seen in a glass tube, but on closing the cock suddenly the water would again appear in the tube, but at a higher level than before. This shows that the impetus of the water was sufficiently powerful to compress the air in the tube beyond the density caused by the dead weight of the water when not in motion. So soon as the air has been compressed sufficiently to overcome the water that has been forced into the tube, a reaction takes place and the air pushes the water out of the tube again. Sometimes this is done so violently, and the water has such an impetus given to it, that it will flow back up the pipe again, eventually returning. On watching the air vessel made of glass it will be found that the surface of the water will not stand steady for some little time after it has been put in motion in the manner described, thus showing that the weight of the water and the resistance offered by the compressed air must be in a state of equilibrium before the motion as seen in the air vessel is arrested. If the whole of the air was exhausted out of the tube a, the above action would not take place, and we should then again have water hammer.

"If a tiny hole, say the size of a pin, was made in the end of the tube at a, a small jet of water would play up as a fountain, but by opening and shutting the bib-cock at b this jet would fall and rise in height as the cock was opened and shut. Water hammer would still be

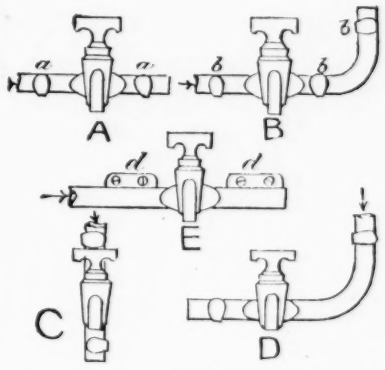


Fig. 2.

heard, but if instead of the small hole a larger one was made, the noise would be overcome. This leads away to another part of our problem, but we will leave it for the time being and confine ourselves to our present subject.

"Experience has taught us the value of chambers containing air as buffers, or cushions, for slowly arresting the flow of water in pipes and preventing sudden shocks. To be thoroughly efficient the air vessel should be placed as near the cock as possible, and in such a position that the column of water is directed onto the body of air. B, Fig. 2 shows the end of the pipe turned upwards. The illustration was used to draw attention to a means for strengthening the fixing of a service pipe with a cock attached, but a further use is that the pent up air in the turned up end acts as an air vessel. For this latter use the small piece of pipe is much too small, and contains too little air to be of any real value. This could be obviated by making the tunred up piece of pipe much longer, so as to contain more air. A further reason for

enlarging the pipe is because after a time a great deal of the air will become absorbed by the water. A small quantity will escape each time the cock is opened. This may be explained by saying that owing to the friction of the water in the pipe some air will escape from the nozzle of the cock, when suddenly opened, before the entire column of water is put in motion. The interval of time for this may be only a fraction of a second, but great events often occur in that length of time. A small size pipe does not make such a good air vessel as one of a larger size. For a ¾ inch pipe a 2 inch air vessel acts very well. The cross sectional area of a 2 inch pipe is equal to a little over seven times that of a ¾ inch pipe, hence the larger amount of air surface for the water to knock against.

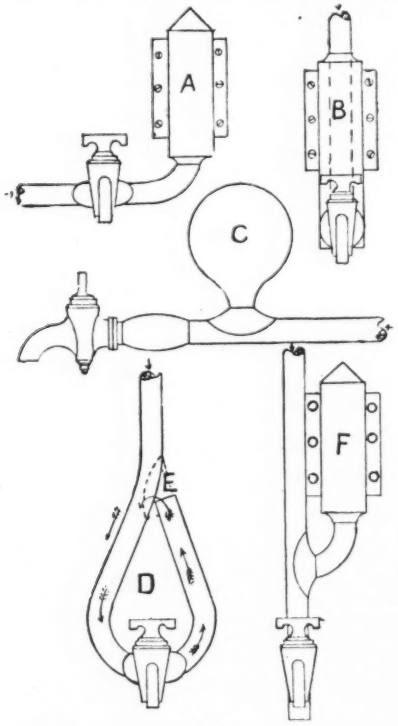


Fig. 3.

"Fig. 3 illustrates a few different methods of fixing air vessels, A being the one last referred to. The chamber is shown as fixed to a wall with face tacks and screws or nails. The darts in all cases denote the direction of the water. The adjoining sketch B is another method, the dotted lines show the service pipe continued inside the pipe nearly to the bottom. But for this, all air would escape up the service pipe, and there would be nothing to prevent water hammer. The sketch C shows a globular or balloon shaped air vessel, branched into the top side of the service pipe; and F shows a common way for treating a vertical service pipe.

"Very often the pipe is treated as shown at D, but this is not nearly so good as the others. The writer once saw the end E soldered into the service pipe, and the plumber was under the impression that the water would run round the pipe as shown by the arrows. Of course, this was a mistake, and some trouble was necessary to disprove the use of the pipe as arranged. When plumbers make air vessels out of lead pipe they should always be very careful to properly seal the ends. It is a good plan to first close the end, by bossing, and then solder it over with fine solder, using a copper-bit for the purpose. When the end is 'wiped' over, and common plumber's solder used, the air will frequently escape owing to the porosity of the solder, more especially when it is coarse or wiped too cold. The other extreme of wiping the end when the pipe is too hot, should be avoided. Wiped joints and ends will often be found to 'sweat,' as it is called, when the solder used is too hot or the joint wiped two or three times in quick succession, so that eventually the pipe becomes so heated that after the joint has been made the heat of the pipe is sufficient to keep the tin in the solder melted, so that it will run to the lower part, thus leaving the lead in what may be called a spongy condition. The small cellules, left by the separation of the tin, will allow air or water to ooze through.

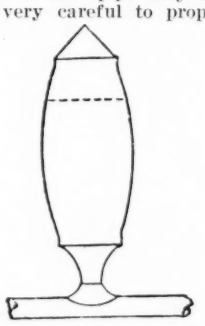


Fig. 4.

If the air escapes by any means out of an air vessel it then becomes useless. Another point to remember is that an air vessel should always be made of stout material, and, if of lead, the lead should be of a good thickness. It is sometimes thought that the vessel is to hold air only, and light lead is good enough for the purpose. I have seen a vessel 3 inches in diameter swell out in the center, as shown by Fig. 4. As the sides bulge outwards the lead is reduced in substance. This bulging would continue until the vessel burst. True, air only is in the vessel before using it, but when in use the air is compressed, according to the head of water, into a smaller space, in some cases, probably to the dotted line shown in the figure. The pressure of water in the vessel may be only about 10 lbs. on the square inch, but this is sometimes raised considerably, and may be from 100 to 200 lbs. per square inch, when the flow of water in the pipes is suddenly checked. A 3 inch pipe made of lead 1-5th of an inch in thickness will only resist a pressure of about 300 lbs. on the square inch, so you will see the necessity of making air vessels very strong.

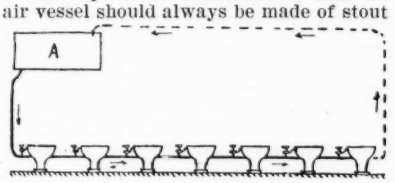


Fig. 5.

"From what has been stated you will understand that air vessels are the right things to use to prevent water hammer, but I must now go further and explain that under certain conditions they will aggravate matters and increase the noises in water pipes—made when opening and shutting cocks. To make this clear, I cannot do better than give a few examples of where this has been the case.

"Fig. 5 represents a row of W. C.'s, each one being flushed by means of a branch from an 1½-inch lead service pipe, and a valve and regulator on an iron frame, screwed to the floor. These are omitted in the drawing. The cistern A was about 10 ft. above the floor. The closets were fixed in a large institution and were in constant use. No matter how carefully the valve regulators were adjusted, one or other of them would frequently get out of order and close so quickly as to start water hammer in the pipes. All the valves would then com-

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others would chatter. On adding an additional weight to the lever of that one another would become troublesome, on weighting that a third one would commence to hum, and so on until so many mence chattering. Air vessels were tried as a remedy, but no matter where they were fixed in the service pipe or what their size, the noises were much worse than before the air vessels were used. As a last resource the main service pipe was continued, as shown by dotted line, back to the cistern and turned over the top edge. This acted as a relief-pipe, and the force of the water was spent in pushing the water out of the top end of the pipe instead of on the valve seatings.

"A second case is shown by Fig. 6. Here four valve W. C.'s, with valves and regulators for flushing, were fixed on different floors. After using one of the W. C.'s the service valves of one of the weights had been added to the valve

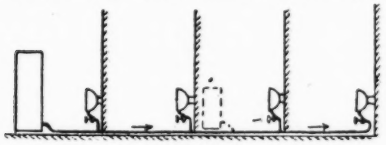


Fig. 6.

levers as to make them so heavy that it became quite a labor to raise the W. C. handles. Air vessels were tried, but the evils were made worse instead of better. Finally it was decided to put an additional cistern, as shown by dotted lines, to supply the two lower W. C.'s, and this was found to answer the purpose of curing the noises in the pipes.

"A third case was in a palace, where a valve W. C. and a bath were fixed side by side and supplied from the same service pipe. Whenever the valve to the bath was opened and shut, that on the W. C. would commence to hum, and the lever to vibrate up and down. The way this was cured may, when compared with previous examples, seem paradoxical. The supply valve to the bath was opened by means of a lever with a knob and chain. On attaching a bellows regulator to the lever so that the valve could not close suddenly, the noises were en-

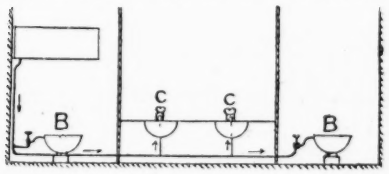


Fig. 7.

tirely cured. An air vessel in this case, too, had been found useless.

One more illustration is shown by Fig. 7. In this case the pipe from a cistern flushed two valve W. C.'s, B B, and also supplied two wash basins, C C, which had 'cam-action' valves to them. These valves closed by means of springs inside them. On using either of the basin valves, those to the W. C. would commence to hum, and vice versa. On fixing an air vessel, the sounds were converted from a hum into a chatter—if the reader can understand the difference in those terms. After a great many experiments had been tried, it was finally decided to fix a separate pipe for the wash-basins, and this was found to be a success.

The writer has had experiences where a long row of wash basins has been supplied from the same service pipe, by means of so-called self-closing valves, where one of them has had a very weak spring to it, and that one has started humming when any of the others has been used. When this occurs, an air vessel has rarely been found to be of any use, but rather otherwise.

"Air vessels should always be fixed when water hammer takes place with bib-cocks: but when the noise partakes more of the nature of chattering or humming, as is the case with spring, and other kinds of self-closing valves, the air vessels have not always been found to be a success. It it difficult to summarize what has been said so as to apply to all or any cases of water hammer that may turn up in practice, because no two cases are exactly similar. The least variation in any detail will sometimes so alter matters that a remedy in one case would not be so in another. After what has been said the reader will doubtless know which remedy to apply when called upon to deal with a problem similar to any that have been described."

Siphonage of Traps.

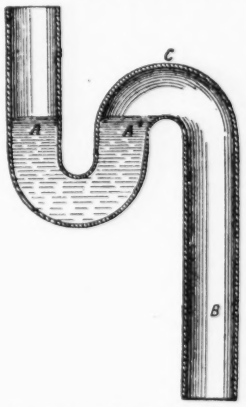
Algonac, Mich.—To the Editor of "Domestic Engineering":

Sir: Will you have the kindness to explain in a simple way what causes a trap to siphon?

Answer.

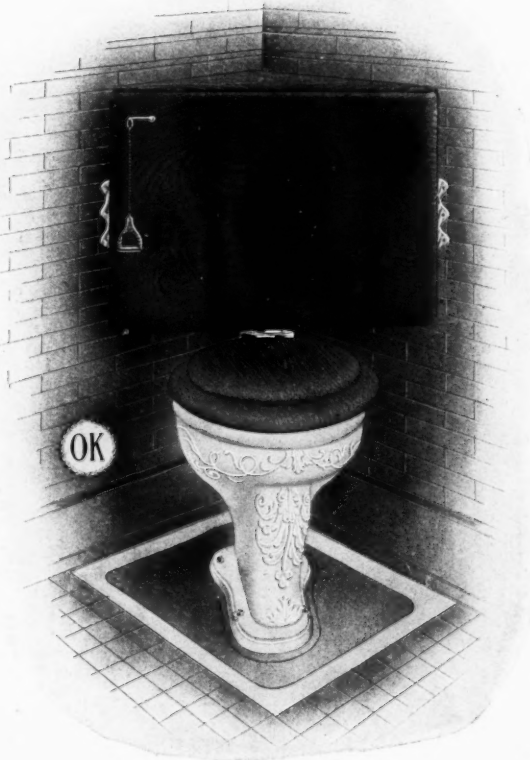
In answer to your inquiry we publish herewith a sectional drawing of an "S" trap, which is one of the most common traps in use, thousands of them being put in place by master plumbers.

This trap simply forms one sort of a siphon, and if the air is exhausted from the tailpiece, B, the water in the dip of the trap, A A, would be drawn out, because of the pressure of the atmosphere above the dip of the trap. The same action would occur if by turning a quantity of water into the trap the water should be forced over the crown of the trap at C and drive out the air in the tailpiece B. The water would flow until all of the water which had been turned into the pipe flowed out and then the pres-



sure of the atmosphere would force the water in the dip of the trap to flow until air had passed through. If a sufficient quantity of water remained at the point A1 after the siphon has been broken to fall back and cover the dip of the trap, the seal would not be broken. And if, on the contrary, the force of the siphonage is so great as to draw most of the water at A and A1 over the crown of

CORNER CLOSET



When you want a closet you may want one bad, or you may want one to go in a corner.

The

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the trap, then that which might fall back would not make a seal and the entry of sewer gas would be permitted.

To prevent this siphonage of the "S" traps, the venting of traps was suggested by which air would be introduced at about C, in order to break the siphon and still leave enough water in the trap to make a seal. The dangers of these vent pipes stopping up and becoming useless are but little understood and are not generally recognized, but they are grave. If vents are used, they should be of a bore equal to the bore of the trap and introduced in the crown of the trap, but in a place where the rushing water will not fly up into them and cause them to be stopped up with grease.

A Lesson for Journeymen.

A writer in Cassier's Magazine recalls that twenty years ago the cities of Albany and Troy were the center of stove manufacture in America. About that time the competition of some westerly points began to be felt. But while the stove manufacturers of Albany and Troy appreciated the danger, their skilled employees banded together in a strong molders' union, ignored it and argued that the then existing conditions could not be changed. Their locality was nearer the source of the pig-iron supply, and could, therefore, always command cheaper iron; and, beyond all, no other points had the same molding sand, and without that successful competition against Troy and Albany stoves was impossible. So strike followed strike. In many of these the men carried their points. The conditions governing the employment of apprentices, the hours of labor and the amount of work produced per man were all satisfactorily controlled; but the development of the natural resources of the great American northwest was not. To-day the blast furnaces of the Hudson river valley are a tradition, and the stove foundries of Troy and Albany are diverted to other uses or else crumbling ruins, while those of Detroit, Aurora, Milwaukee and other cities further west are echoing the thud of the rammer, the clank of the molding machine and the blast of the cupola.

Havana a Healthy City.

A report has been received at the war department from General Wood showing that the death rate for the city of Havana for the month of February was 19.32 per 1,000, which is said to be below the average of most American cities. The death rate, it is stated, is steadily decreasing and this is taken as an indication of improved sanitary conditions. The death rate is considered remarkable. During the last February of Spanish rule, in 1898, it was 82.32 per 1,000. The particular object of the report is to endeavor to correct what are said to be erroneous impressions concerning the sanitation of Havana, and attention is called to the fact that that city now can be classed among the healthy cities of the world.

A Splendid Job.

Joseph Miller, sanitary plumber, 473 Fourth avenue, has just completed one of his very best pieces of work on the J. L. Winthrop residence, 10 East 37th street. An extension was added and the entire structure remodeled, the new bath rooms being all tile. The work amounted to over $6,000, and is a splendid specimen of up-to-date plumbing by an up-to-date plumber. J. L. Mott & Co. furnished the closets and Ronalds & Johnson the baths.

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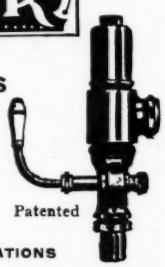

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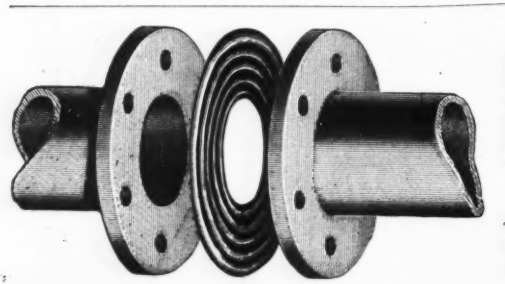

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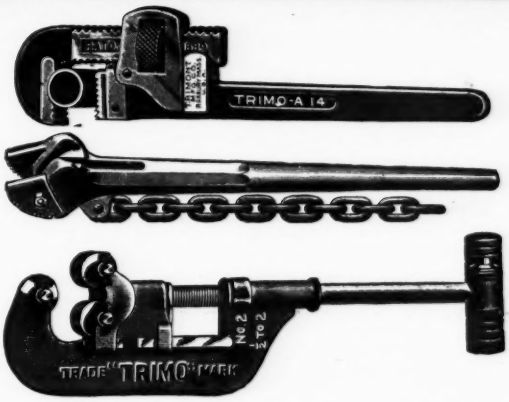

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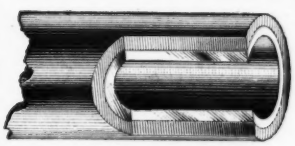

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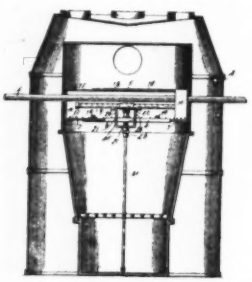
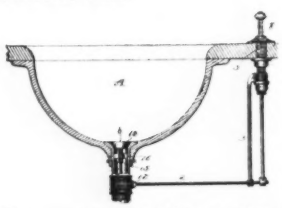
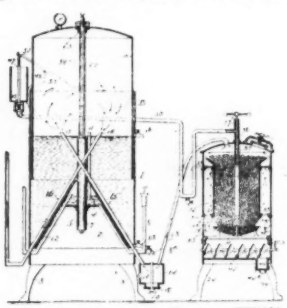


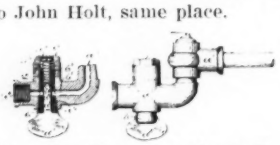
667,834—Basin-waste. Henry M. Weaver, Mansfield, Ohio.



668,288. Acetylene-Gas Generator. George P. Gaston, Silver Creek, N. Y.

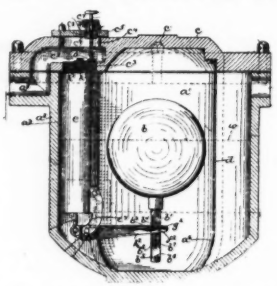


668,406. Safety Gas-Cock. William H. Holt, Providence, R. I., assignor of one-half to John Holt, same place.

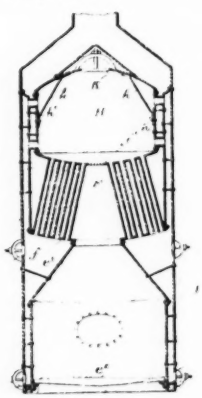


668,467. Pipe-Wrench. Moses Z. Vian Malone, N. Y.

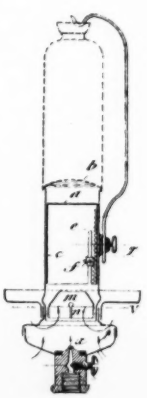
668,302. Steam-Trap. Allen J. Wright, Cleveland, Ohio, assignor to the Wright Manufacturing Company, same place.



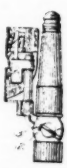
668,326. Water-Tube Boiler. Martin J. Burke, Marion, Ohio.



668,628. Incandescent Gas-Lighting Burner. Georges Delin, Brussels, Belgium.



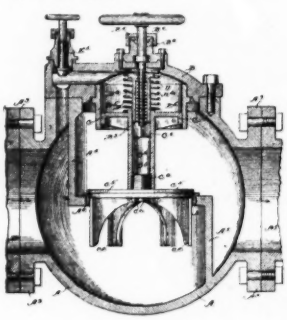
668,368. Gas-Igniting Device. Gustav A. W. Barkowsky, Allegheny, Pa., assignor of one-half to Robert E. Wilson, same place.



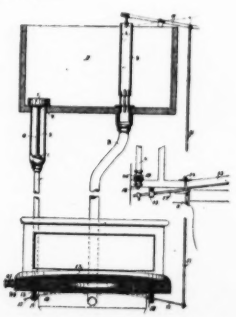
668,495. Grate and Bar Therefor. Paul L. Crowe, Duluth, Minn.

668,645. Pipe-Wrench. Ambrose F. Jackson, Rock Island, Ill.

668,648. Automatic Valve. William D Klipfel, Chicago, Ill.



668,709. Flushing-Tank. Ira P. Clarke, Alameda, Cal.



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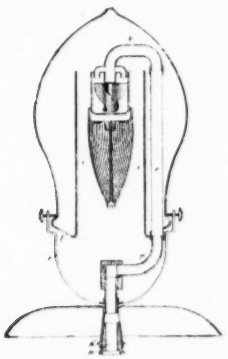
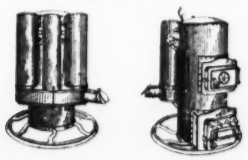
H. C. TOWNSEND, formerly Prin. Ex'r.
D. H. DECKER, late Ass't Ex'r, U. S. Pat. Office.

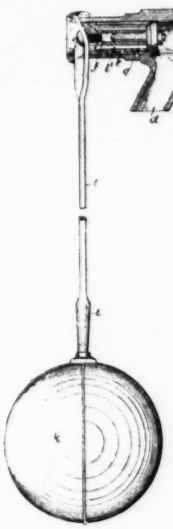
668,676. Incandescent Gas-Burner. Emanuel Cervenka and Josef Bernt, Prague, Austria-Hungary.



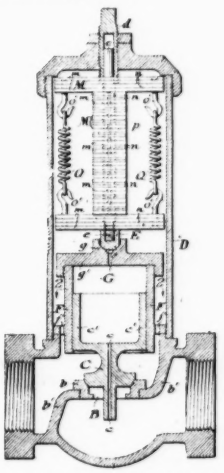
34,149. Hot-Air Furnace. John H. Laux, Harry Van Bayse and William D. Harrison, St. Louis, Mo., assignors to the American Furnace Co., same place.



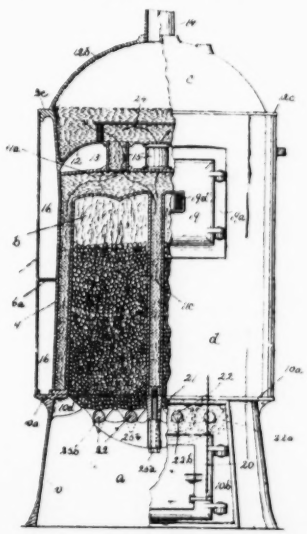
668,652. Valve or Cock Operated by Ball-Float, Etc. Alfred E. Markwick, Karachi, India.



668,766. Steam-Trap. Frederick L. Bickel, Philadelphia, Pa.



668,841. Steam and Hot-Water Heater. William H. Page, Norwich, Conn.



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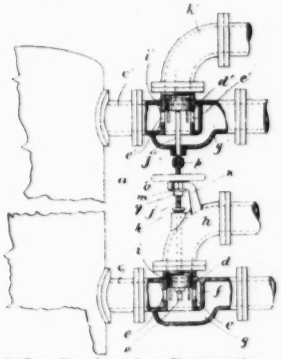
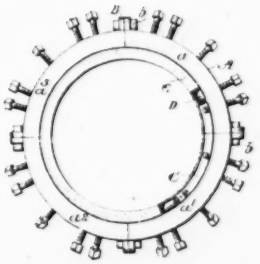
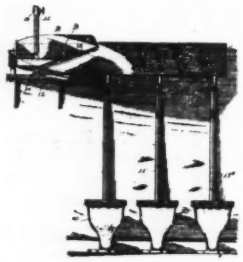
668,782. Filter. Charles E. Torrance, Northampton, Mass.



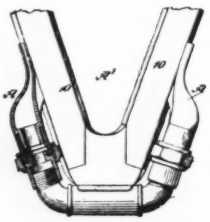
668,847. Device for Preventing Leaks in Steam-Pipes. John Birnbaum, Philadelphia, Pa.



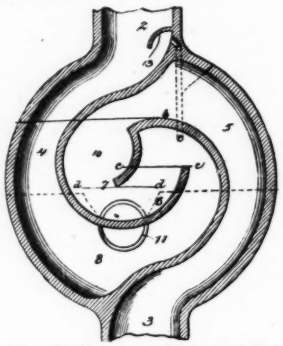
668,853. Flushing Apparatus for Water-Closets. Richard J. Gatling, New York, N. Y.



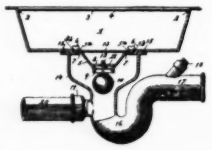
668,872. Urinal. William H. Dewar, New York, N. Y.



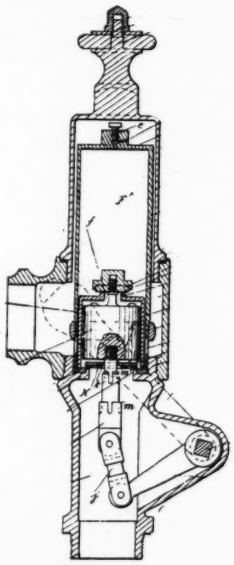
668,776. Plumber's Trap. Edward Riley, Spokane, Wash.



669,042. Backwater Floor and Stable Drain. John F. Cotter, Kansas City, Mo., assignor to L. E. Wyne, same place.



668,837. Valve for Water-Closets. David T. Kenney, North Plainfield, N. J.



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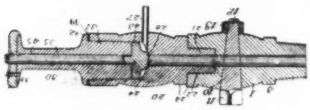
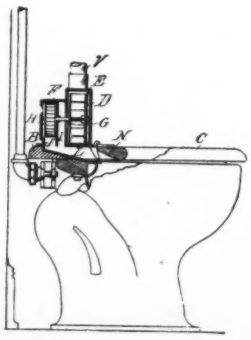
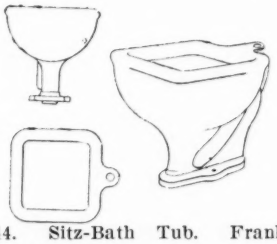
668,997. Gage-Cock. Jacob Miller and Francis E. Hart, Weatherly, Pa.



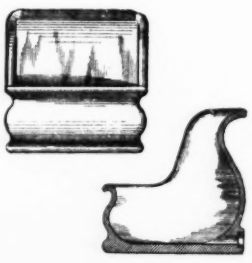
669,062. Ventilating Device for Water-Closets. Albert Drouillard, Windsor, Canada, assignor of one-half to Edmund I. Scully, same place.



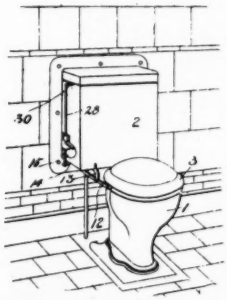
34,143. Siphon-Jet Slop Sink. Stephen D. Baker, New Haven, Conn., assignor to the Peck Bros. & Co., same place.



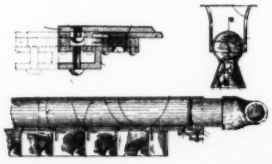
34,144. Sitz-Bath Tub. Frank A. Wells, New York, N. Y.



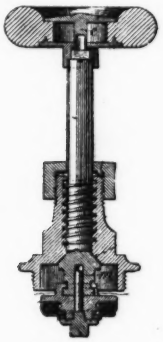
668,999. Water-Closet Flushing Apparatus. William H. Osborn, Louisville, Ky.



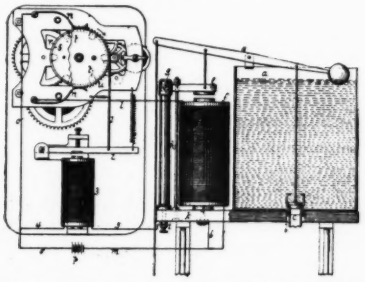
667,502—Sediment collector for steam boilers. Henry R. Churchill, Buffalo, N. Y.



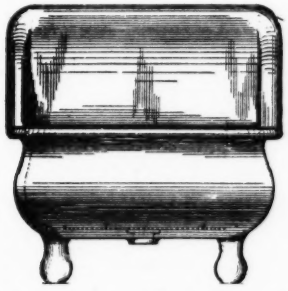
668,881. Valve. Jeremiah O'Meara, New York, N. Y.



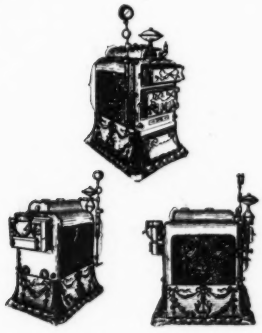
668,990. Flushing Device. Gertrude M. Jenkins, New York, N. Y.



34,145. Sitz-Bath Tub. Frank A. Wells, New York, N. Y.



34,109. Casing for Generators. Edward P. Waggoner, Syracuse, N. N. Y., assignor to A. A. Griffin Iron Company, Jersey City, N. J.



WRITE FOR ONE.

The Julian D'Este Company, 24 Canal street, Boston, are sending out their new catalogue of engineering specialties, plumbers, steam fitters' and mill supplies. They write us that they will be glad to forward a copy to anyone who asks for one, mentioning "Domestic Engineering."

"GRAPHITE."

The above is the title of a four-page monthly, printed on enameled paper and issued by the Joseph Dixon Crucible Co., of Jersey City, the April number of which has just come to our desk. The leading theme in this issue is "Paint," more particularly Dixon's "Silica-Graphite" paint for preserving architectural iron, tin roofs and metals of all kinds from corrosion.

The last page contains an illustration and sketch of the immense new Broad Exchange Building, the structural steel for which (10,000 tons), was given a priming coat of Dixon's Silica-Graphite paint before leaving the Carnegie Steel Company's mill, and a finishing coat after the erection of the steel work by the Geo. A. Fuller Company.

CATALOGUE ON THE PRESS.

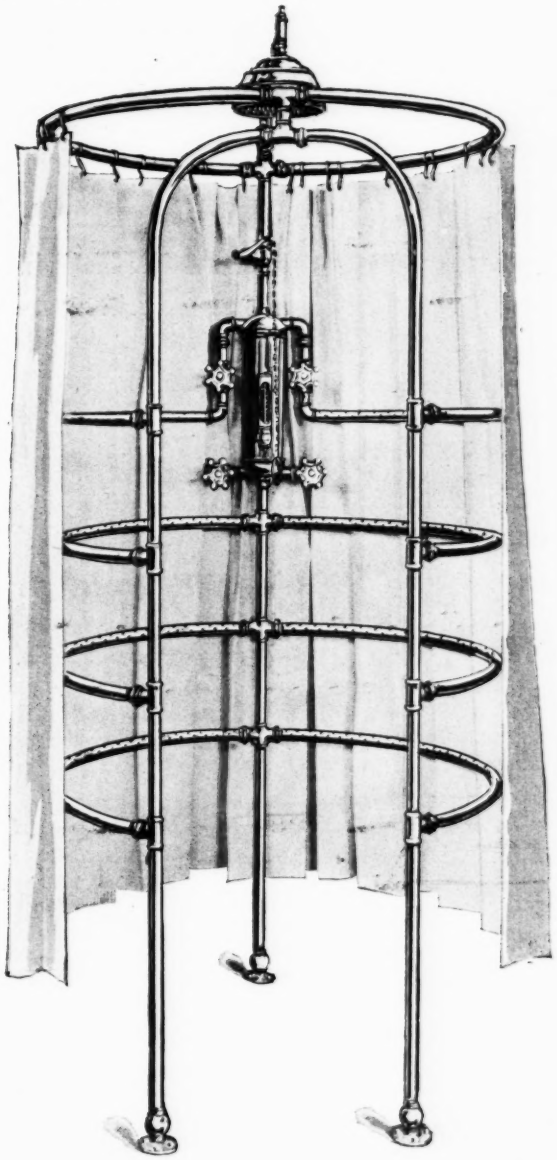
The Barnes Mfg. Co., of Mansfield, O., manufacturers of iron and brass pumps and cylinders and hydraulic rams, tell us that they have given to the printers copy for a 200-page catalogue 6½x9½, which will be one of the most complete catalogues ever issued by any pump manufacturer. It will be ready to be sent out in a few weeks and they would be pleased to receive requests from the trade for these catalogues. They will also issue at the same time a pocket edition which will be the same in every particular except size as the large catalogue.

STEAM FITTERS TO MEET AT NIAGARA.

It is rumored that the annual convention of the National Association of Steam and Hot Water Fitters will meet at Niagara Falls on June 10-12. The rumor lacks official confirmation but is said to be reliable.

A BEAUTIFUL FIXTURE.

This illustration shows a special shower bath fixture manufactured by Street & Kent Manufacturing Co., of Chicago. It



will be recognized as one of the handsomest fixtures of the kind on the market, and still it is only one of a very large number of such goods manufactured by this concern, who will be glad to send a catalogue upon application, mentioning "Domestic Engineering."

NEW LEAD PIPE WORKS FOR NEW YORK CITY.

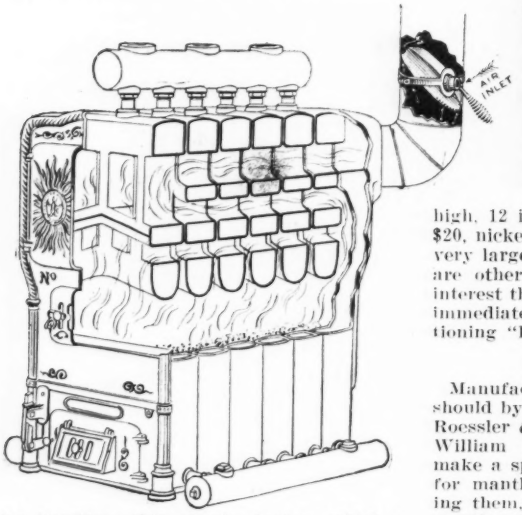
Mr. J. D. Abraham, the compiler and publisher of trade catalogues in the Bennett Building, New York, is about to establish in that city, on the upper east side, a plant for the manufacturing of lead and block tin pipe, solders, babbit metals, etc. Mr. Abraham has secured an excellent location, with the best of shipping facilities by water and rail. He has associated with him one of the most experienced foremen in the metal trades. Mr. Abraham will continue his catalogue business, and at the same time assume control of the new lead works, which will be placed under the active management of his two sons, Jos. M. and Walter D., together with an associate whose name is not yet public.

SPECIAL AGENT FOR PHILADELPHIA.

The Ashton Valve Co., 271 Franklin street, Boston, announce the appointment of Mr. Geo. E. Hubbert, 123 No. 4th street, Philadelphia, Pa., as special agent for that city for the Ashton pop safety valves and steam gauges, after April 1st.

THE AEOLIPYLE.

When a good thing is discovered, even though it be simple, there is a great rush of the trade to get hold of it. The degree of the rush indicates somewhat the degree of the goodness, so that the Aeolipyle must be a mighty good thing to account for the tremendous business which has been built up in a short time. The heating trade can make a lot of money



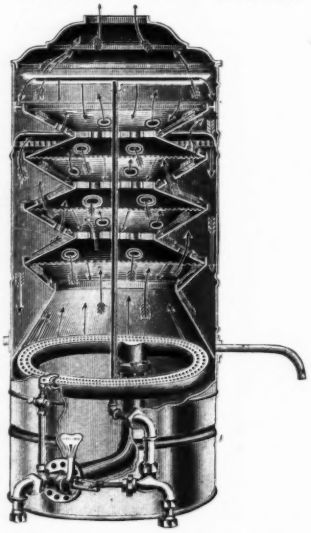
by handling this simple device, which, when properly applied to a smokestack, saves time, labor, coal and makes additional heat, making a heating plant much more satisfactory and useful. Upon application for the agency to the Aeolipyle Co., 117 Beekman street, New York City, mentioning "Domestic Engineering," circulars will be sent.

DYRENFORTH, PATENT ATTORNEY.

R. G. Dyrenforth, of 602 F street, N.W., Washington, D. C., solicits business of the readers of "Domestic Engineering," and bases his solicitation upon the fact that he is an ex-commissioner of patents and gives special attention to plumbing, heating, lighting and ventilating inventions. It is a great advantage for inventors to have their attorney in Washington, where he can act immediately at the patent office. When writing Mr. Dyrenforth, kindly mention "Domestic Engineering."

THE ACME NO. 15.

This heater is made by the Instantaneous Water Heating Co., Ohio & Orleans streets, Chicago, and they put it forth with the claim that it heats more water with a smaller gas consumption than any heater in the market. It is 28 inches



high, 12 inches in diameter, and lists at $20, nickel plated. Its heating surface is very large considering its size, and there are other features about it which will interest the plumber greatly. You should immediately write for discounts, mentioning "Domestic Engineering."

MANTLE CHEMICALS.

Manufacturers of incandescent mantles should by all means correspond with the Roessler & Hasslacher Chemical Co., 100 William street, New York City, who make a specialty of dealing in chemicals for mantle manufacturers. When writing them, will you have the kindness to mention "Domestic Engineering?"

"A TOWER OF STRENGTH."

This significant sentence appears on the trade mark of E. W. Blatchford & Co., of Chicago, manufacturers of lead traps, lead pipe, ferrules and other similar goods used by plumbers. It is used in connection with the word "reputation," and the significance of the trade mark is the fact that the firm has lived up to it and has always insisted that their goods should be of the very best possible character. And the reputation of their goods has indeed become a tower of strength to the firm.

A QUEEN THEIR PATRON.

The L. E. Rhodes Co., of Hartford, Conn., number among their recent orders one for an organ motor for the palace of Queen Marguerita, at Rome.

A CHALLENGE TO ALL COMERS.

Thomas Hyde, of 67-69 Perry street, Albany, N. Y., manufacturer of Hyde's patent automatic extension water closet, is much incensed at the criticism of range closets which has been freely indulged in in certain quarters of the country, and issues the following general challenge to all who wish to meet him in a discussion of the matter from a sanitary standpoint:

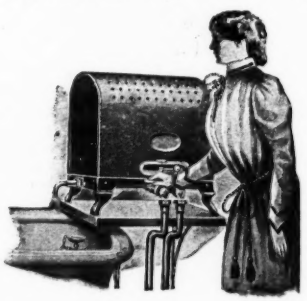
To the Editor of "Domestic Engineering":

Sir: Having noticed lately that many wiseacres among the plumbers and plumbing inspectors, and particularly one in Pittsburg, have set themselves up against a water closet range, I now challenge the world to show a better sanitary condition than I can show, where water closet ranges have been in use eleven years without expense to any one, or I will challenge any one to meet me on sanitary grounds with anything made and I will use a water closet range. I will set it anywhere in the same building with my competitor, the results to be determined after three months' trial, by a disinterested party. Come right on!

Yours respectfully,
Thos. Hyde.

THE VICTOR HEATER.

The Victor instantaneous heater is a clever device made by W. J. Adam, Joliet, Ill., occupying little space, being al-



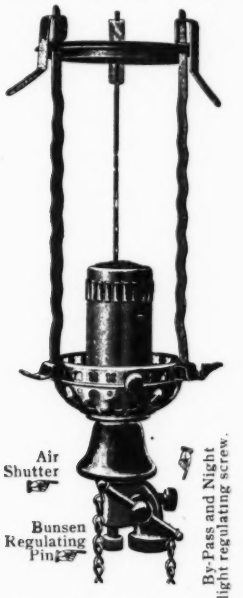
ways ready and furnishing hot water in a few seconds by day or night. Its smallness and simplicity recommend it to the trade, who will find it possible to install it many times where a more expensive heater could not be sold. Upon application, mentioning "Domestic Engineering," a catalogue and price list will be sent.

Patents Secured.

Thomas A. Edison says Dyer, Edmonds & Dyer, of 31 Nassau street, New York City, have done all his patent soliciting work for the United States and foreign countries continuously since 1882. If Edison can trust these people with his immense business, certainly there should be no doubt in the minds of our plumbing friends as to their responsibility. In writing, will you please mention this paper?

The Eagle Burner.

This illustration shows the "Eagle" No. 7 gas burner for incandescent lights. This is as clever a burner as has ever been placed on the market. This burner has an air shutter which is easily arranged and does not lock itself tight. It has a by-pass regulating screw, which permits a night light to be burned in the center of the burner, thus preventing carbonizing of the mantle as the flame does not burn on the side as other by-pass burners have it. It can be used as by-pass when desired, or as a night light by



simply turning this regulating screw. The screw at the bottom is the Bunsen regulating pin which adjusts the volume of gas or air and permits you to regulate your burner in accordance with the pressure of the gas which you may have in your locality. There is no burner which has all these features except this, and we strongly recommend it to the trade. Upon application to the S. Bernstein Co., 82-86 West Broadway, New York City, prices will be sent.

To Brass Manufacturers.

Economy in production is the key-note to success in the manufacture of plumbers' brass goods. Competition in these goods has become so severe that manufacturers are compelled to look for every possible advantage in producing their goods. It is a mistake to reduce the quality of the material entering into the goods. That is detected very quickly by the trade, and is resented. It is a mistake to lighten the goods, thus making them unreliable and not durable. But it is not a mistake to get the very latest machinery for manufacturing goods, and in this connection you should write to the Meriden Machine Tool Co., Meriden, Conn., for description of their forming lathes. When you write, please mention "Domestic Engineering."

The Furman Boiler.

This is the new model of the Furman boiler which is interchangeable for steam or hot water. It is of the popular sectional type, self-contained, surface burning, is made in nineteen sizes, with capacity from 350 square feet to 4,000

square feet. It can be very readily enlarged. It is made by the Herendeen Manufacturing Co., of Geneva, N. Y., and by writing to them to-day, addressing your letter to Department D, you will secure free a fitter's handbook containing very valuable information for practical fitters.

The Broomell Vapor System.

The Vapor Steam Heating Co., of York, Pa., will send you a catalogue which describes the "Broomell" vapor system of steam heating, which is adapted to buildings of any kind or size, has all the advantages of hot water heating without any of the objectionable features, is absolutely noiseless, has no pressure, no air valves, no pumps or machiney. It can be installed by any steam fitter, and costs much less than some other systems. When you write for this catalogue, which you ought surely to have, you will please mention "Domestic Engineering."

The Fan Season.

Now is the time when plumbers must get ready to put in fans for hot weather. This illustration shows a water fan for desk or wall, and is made by D. L. Bates & Bro., Dayton, O., who also make electric fans for ceiling, desk, wall or column of any voltage. Upon application, mentioning "Domestic Engineering," a catalogue and prices will be sent.

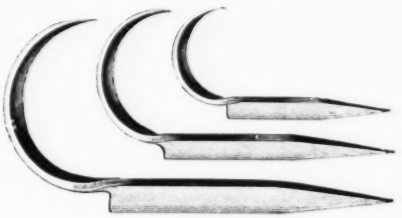
The Dunning Boiler.

This is the Club Junior, a new type of boiler, made for small houses. It comes in four sizes, running from 175 square

feet up to 300 square feet for steam, and 275 square feet up to 525 square feet for water. It is a good boiler, made by a reliable concern, and their catalogue should be in the hands of every fitter who desires to present all good types of goods to his customers. Upon application to the New York Central Iron Works, Geneva, N. Y., mentioning "Domestic Engineering," a catalogue will be sent.

Pipe Hooks and Straps.

These are some illustrations of the line of pipe hooks and straps made by the Berger Bros. Co., 231-237 Arch street, Philadelphia, Pa. They are made in



every size and kind and of the best quality of material. They will be glad to quote prices to you upon application, mentioning "Domestic Engineering."

The Xntric Ball-Cock.

Plumbers have been wanting for a long time a ball-cock which would have the features which are presented in the Xntric, an illustration of which we are showing herewith. The first important thing about this which will strike the plumber is the size of the ball, which is only 3½ inches in diameter. This is rendered possible by the fact that the valve

is closed by water pressure, obviating all danger of accident. The valve is noiseless and positively cannot hammer. It is guaranteed for two years, and can be used with hot or cold water or with high or low pressure. If you want a little flyer telling you more about this valve, write to the Xntric Valve Co., 36 Columbus avenue, Boston, Mass., mentioning "Domestic Engineering."

It Made a Hit.

James Croke, author of the "Guide to Bronzing and Enamelling," which had such a large sale, is getting out the second edition, which will be ready for the market about May 1st. Mr. Croke, who has in the past represented the Fuchs & Lang Manufacturing Co., 29 Warren street, manufacturers of bronze powders, radiator bronzes, etc., in New England and Canada, is now making a six-weeks' trip through the principal cities of New York state for this company, and the trade will undoubtedly appreciate the visit of a genial gentleman, not only highly versed in the goods he handles, but also representing the largest manufacturer of these goods in the world.

Rapid Growth of Enterprising Firm.

Owing to the entire inadequacy of their old quarters at 511 Grand street to the needs of their steadily increasing business, the Metropolitan Supply Co. has moved up into the fresh air and pure sunlight of Harlem. At 2505 Third avenue, their new location, they occupy the entire building with their large and complete line of plumbers' specialties and

plumbers', steam and gas-fitters' supplies. They are now carrying a large stock of slate and marble work for plumbers and builders and tiling in great variety. The growth of this company's trade has been very gratifying and they are glad to be able to announce to their friends that they are now in a position to fill all orders with promptness and precision.

THE MASON REGULATOR.

This is an illustration of a water pressure regulator to stop the waste of water, preventing its flying and spattering, obviating the wear and tear of water hammering or concussion in pipes. It reduces the cost of plumbing repairs and is war-

ranted to maintain the desired pressure with perfect uniformity, regardless of any or all fluctuation in the outside pressure. It is made by the Mason Regulator Co., 6 Oliver street, Boston, Mass., who will send you a catalogue of their goods if you mention "Domestic Engineering."

advance proofs of a number of the elegant half-tone cuts and illustrations which will be used, and he can safely say that the forthcoming catalogue will be one of the finest things of the kind ever published. This firm seeks to inculcate the wise maxim that the best is the cheapest. To meet the modern demand for open plumbing they manufacture a line of nickel plated traps, basin wastes, basin supply pipes, lavatory legs and lavatory brackets that are unrivaled for beauty and durability.

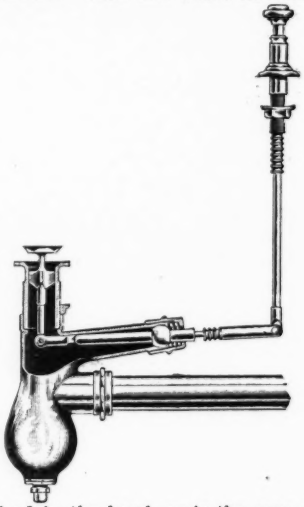
A NEW SANITARY WASTE.

This beautiful illustration shows the application of the combination bath waste and overflow as manufactured by the H. W. Weaver Co., of Mansfield, O., which takes the place of the old-style standing waste and overflow. This waste takes less room to rough in than other styles of wastes. It has a metal plug which closes the waste in the tub at a point where the water leaves the fixture. The plug is operated by a rod at the side of the fixture, and has no catch to adjust when opening or closing. It is on a ball-bearing lever, and requires only a touch of the hand to open or close. The waste is also applied to lavatories.

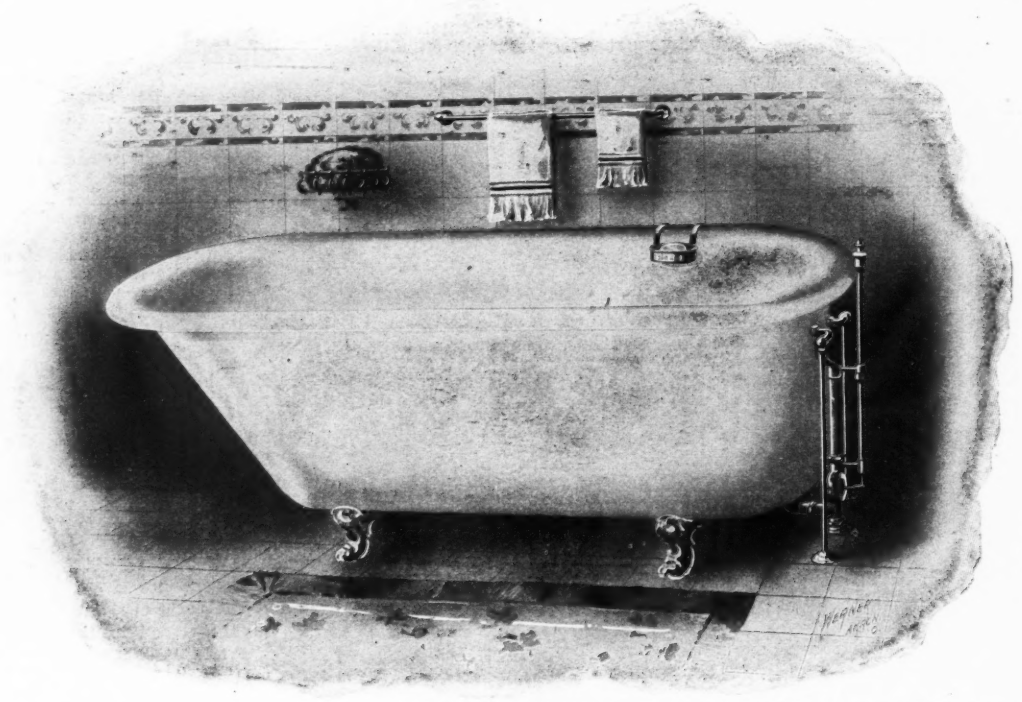
It is a well known fact that the different styles of standing wastes now in use do not separate the water in the lavatory or tub, from the pipe which extends below and forms the overflow and trap. These pipes soon become very foul and can only be cleaned by disconnecting the fixture. It is evident that the water in the lavatory is in direct contact with all the impurities thus hidden from sight, and must be contaminated.

We also illustrate the waste itself, which is adjustable and can be fitted to

parts of the Weaver basin waste, it will be seen that it is very simple in its construction. The lever is ball bearing, so that it is impossible for a leak to occur where the rod leaves the waste. By raising the handle the waste plug drops into position, closing the connection with the trap. The waste is opened by lowering the handle. With this waste no chain is



required in the bowl, as is the case with the old-style patterns. It can be taken entirely apart without interfering with the attachment of the bowl. By removing the plug and strainer and unscrewing the ball cap, the lever can be withdrawn, leaving every portion of the waste open to inspection. This company



WATCH FOR THIS CATALOGUE.

The Good Manufacturing Co., 132 and 134 Brook avenue, who make an immense variety of plumbers' brass, nickel plate and rubber goods, will shortly issue a catalogue which is going to be a revelation in that line. A representative of "Domestic Engineering's" Greater New York edition was allowed a peep at the

any style of lavatory as quickly as any of the old style trap wastes. The trap is made in different styles, so that it can be used where any lavatory can be set. The vent connection is attached to the waste pipe, and by changing the waste connection only the trap can be fitted with a vent connection when it is desired. By examination of the working

belives in good advertising, and has prepared one of the most beautiful catalogues which it has been our pleasure to see. Copy of their catalogue, together with prices and discounts on the waste, will be sent upon application, mentioning "Domestic Engineering."

The New York office is at 81 Fulton street.

Quick Water Heaters

Not Quite Instantaneous

Price, $12.00 to $18.00

Large size has 8 square ft. heating surface

J. S. EMERY

1114 S. 15th Street TOLEDO, OHIO

Steel pipe is easily and accurately threaded with our modern tools

The Oster Mfg. Co.
8 East Prospect Street, Cleveland, Ohio

This is a reproduction of the cover of a complete guide to the Pan-American Exposition just issued by the LACKAWANNA RAILROAD. It will be mailed to any address on application, accompanied by four cents in stamps, to

T. W. LEE,
General Passenger Agent,
26 Exchange Place,
NEW YORK CITY.

Some Reasons for Sending Us Your Orders

1. We value them.
2. We give them careful attention.
3. We make prompt shipments.
4. We give good value for the money, (some say the best).
5. We cheerfully correct errors (some concerns never (?) make any.)

Next month we give you additional reasons.
We handle everything in Plumbing, Gas, Steam and Water Supplies.

Sanitary Specialty Manufacturing Co.
55-57 N. CLINTON ST., 24-30 MILWAUKEE AVE., CHICAGO.

"Let Well Alone", is a dangerous proverb for business men. You can increase Your Trade by advertising in

DOMESTIC ENGINEERING.

Eminent chemists testify that our Water Filters are germ proof. No chemicals used; Filters can be thoroughly cleansed without removing any part.....
....Results guaranteed....

CAPACITY
10 to 10,000 gals. per hr.

Hundreds of our customers have furnished voluntary testimonials.

LIBERAL DISCOUNTS TO PLUMBERS.

Catalogue Mailed on Application.

WM. B. SCAIFE & SONS,
PITTSBURGA, PA.

THE "NO LEAK" REGULATOR.

This is a valve mechanism perfectly constructed for controlling fluid pressures. It is guaranteed not to stick or leak. It has been received by the trade

with a great deal of satisfaction, and its sales are increasing constantly. Upon application to Hugh Merrie, 225 East Ninth street, Cincinnati, O., prices and discounts will be sent, if you mention "Domestic Engineering."

MORE CONVENIENT LOCATION.

The J. B. Colt Company, well known manufacturers of acetylene gas generators and accessories, removed on April 1st, from the temporary offices at 108 Fulton street, which they have been occupying since their fire in Thirty-second street, to No. 21 Barclay street. The new offices are located in connection with a large store where one of their generators will be kept in constant operation. They are easy of access, being less than one block west of Broadway and the general postoffice. This firm has within the last month completely equipped a new factory in order to meet the increasing demands of their trade.

BOYNTON HEATERS.

The Boynton Furnace Co., of New York City and Chicago, have made a specialty of manufacturing steam and hot water heating apparatus and furnaces for over fifty years. In an experience extending over that length of time they have met every phase of the heating problem and have adapted their heaters to conform to them. It has been their constant aim to make economical and durable apparatuses, and that they have succeeded is fully demonstrated by the fact that they have been continuously in business for so long. We show herewith their return flue water heater. A catalogue, price list and discounts will be sent to the trade, and every effort is made by the company to co-operate with the trade in securing and holding business.

THE MARSH AIR VALVE.

We show herewith the Marsh No. 7 vacuum automatic air valve, which contains features which will be furnished upon application to those interested in

such goods. The Marsh quality has been for years a standard. Catalogue and prices of the full line of automatic valves as made by Jas. P. Marsh & Co., 222 Washington street, Chicago, will be sent upon application, if you mention "Domestic Engineering."

THE RICHMOND HEATERS.

The Richmond Stove Co., of Norwich, Conn., are among the oldest manufacturers of steam and hot water boilers in the United States. Their line of boilers is the culmination of years of experience and are the results of exhaustive tests in construction. Consequently any contractor who takes up with their line of goods will find them to be "heaters that heat." Upon application to them, mentioning "Domestic Engineering," a catalogue will be sent.

THE DAVIS VALVES.

We show herewith an illustration of one style of air valves made by G. M. Davis Regulator Co., 106 North Clinton street, Chicago, Ill. It is known as No. 7, and is designed for wet steam systems.

It automatically closes by steam or water and is guaranteed to be a very superior style of valve. Other styles of valves are manufactured by this company, and upon application, mentioning "Domestic Engineering," a catalogue of their full line will be sent.

ARE YOU LOOKING FOR A PATENT?

Plumbers desiring to take out patents should correspond with Clark, Deemer & Co., attorneys, 225 Broadway, New York City, who have had a large experience and whose prices are reasonable. Mention "Domestic Engineering" when you write.

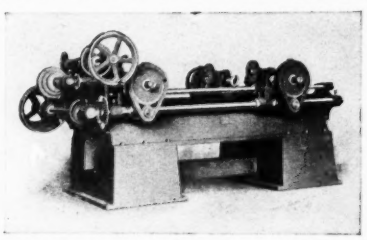
COOPER'S ADJUSTABLE DRAIN TRAP.

A large number of plumbing inspectors speak unreservedly in favor of the use of the Cooper adjustable drain trap, which we show herewith. It has a 4-inch seal and is an absolute protection against

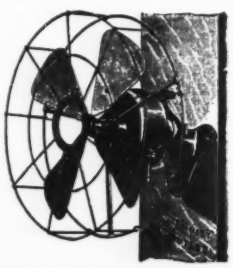
sewer gas. There is also another advantage about it, which is that from $1.75 to $2 is saved on the installation of each trap. If you will write to Libbey, Parker & Co., Boston, Mass., they will send you information as to how to make money, if you mention "Domestic Engineering."

A FOUR-SPINDLE HEATER DRILL.

Manufacturers of heater sections will find this four-spindle heater drill interesting. It is designed for boring, facing



and tapping radiator or heater sections. The spindles have both hand and power feed, quick advance and return, and auto-



FANS WATER FANS FOR DESK AND WALL ONLY

ELECTRIC FANS
FOR CEILING, DESK, WALL OR COLUMN
ANY VOLTAGE

SEND FOR CATALOGUE AND PRICES TO D. L. BATES & BROTHER, Dayton, Ohio

Standard Practical Plumbing.

By P. J. Davies.

A book for practical plumbers by a practical plumber. A complete encyclopaedia of the trade. Treats fully, plainly and practically of everything connected with the trade, and is illustrated with 768 cuts. This is a book every working plumber will enjoy and get benefit from. 355 large pages.

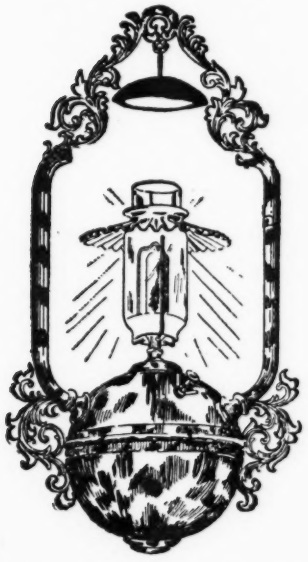
Will be sent prepaid on receipt of $3.25. Address

DOMESTIC ENGINEERING,

Chicago, Ill.

The Lamp of Lamps

Sent on approval to the Trade.



500-Candle-power air-pressure "Search-Light" Vapor Lamp, costing One-Tenth of Electricity; also 100 candle power lamps in various styles.

GET CATALOGUE

Search-Light Mfg. Company

358 Dearborn St., Chicago, Illinois.

McVAY & WALKER
Manufacturers of
Enameled Tubs.

WILL GLADLY SEND PRICES ON THE TWO BEST TUBS MADE.

Write Today. Unique and Eureka Prices will surprise you.

BRADDOCK, PA.

GET THE LATEST

and best Low Down Closet Combination on the market

The Adonis

Write for advance sheets showing

FINE BATH ROOM FIXTURES AND SANITARY SPECIALTIES

Manufactured by

The Western Brass Mfg. Co.

615-617 Walnut Street, ST. LOUIS, Mo.

matic stop, and will bore and face four 5-inch holes at once. It is manufactured by the Bickford Drill & Tool Co., of Cincinnati, O., who also make a six-spindle machine for making three part sections. Their new catalogue describes this four-spindle drill much more completely than this, and it should be in the hands of every manufacturer of such goods, and will be sent upon application, mentioning "Domestic Engineering."

Merrick & Son, of New Brighton, Pa., are engaged on some work in which they are using some of Cooper's goods.—Adv.

Anticipate Busy Season.

The N. O. Nelson Mfg. Co., St. Louis, Mo., evidently look forward to a big trade during the opening season. They are warning their regular customers to take time by the forelock and order before the rush comes, as it will undoubtedly be exceedingly difficult to get goods for prompt shipment once the busy season opens.

Keep Informed as to Prices.

The buyer needs to watch his prices more closely to-day than ever was known, because it is the good buyer who gets the business. One of the best ways we know of for getting "next" on prices is to ask the N. O. Nelson Manufacturing Co., of St. Louis, Mo., to place you upon their mailing list, so that you will receive every month their revised discount sheet. This will be done if you mention "Domestic Engineering," when you write and if you are entitled to receive the discount.

A Novel Advertising Scheme.

The American Radiator Company are sending out from their general offices, Lake and Dearborn streets, Chicago, a booklet containing a series of advertisements, written by the most expert advertising writer and suitable for use in daily papers. To any customer who wishes, the company proposes to loan the use of duplicate electrotypes of these advertisements, with space left blank for insertion of his own name and address. The advertisements, several of which are extremely clever, are designed to relieve the heating contractor of the necessity for ad. writing, a task for which most men have small qualification and smaller liking. The insertion of these advertisements in local papers cannot but do much toward educating the people up to an appreciation of modern methods of heating, and those who make use of them should reap a rich harvest of orders.

The R. P. Willis Co., Springfield, O., have some work on hand in which they are using Cooper's goods.—Adv.

"Nothing Succeeds Like Success."

Blake & Andros, of Boston, Mass., the popular manufacturers of the "B. & A." elbow-valve, have made phenomenal inroads upon the trade with their goods, as is evidenced by the following list of jobbers now handling same:

Boston, Mass: Braman, Dow & Co.; Brown & Wales, J. H. Cunningham Co., A. A. Griffing Iron Co., Thos. Hoey, Pierce, Butler & Pierce; Wm. H. Page Boiler Co., Magee Furnace Co., Herendeen Mfg. Co., W. B. Hubbard & Sons.

Worcester, Mass.: Braman, Dow & Co.

Fall River, Mass.: Jansen, Lavigne & Jansen.

Springfield, Mass.: Hitchcock Supply Co.

Manchester, N. H.: Manchester Heating and Lighting Co.

Copenhagen, Denmark: Reck Heating Co.

Frastroms Workington, England; Geo. Barker & Sons.

New Haven, Conn.; C. S. Mersick.

Chicago, Ill.: Jas. B. Clow & Sons, the John Davis Co.; Kellogg, Mackay, Cameron Co.

Toledo, Ohio: Jos. F. Grosswiller Supply Co., Toledo Supply Co.

Philadelphia, Pa.: Pierce, Butler & Pierce; Penn Engineering Co., A. A. Griffing Iron Co.

Appleton, Wis.: J. A. Engel.

Grafton, W. Va.: Alex Zeck.

Montreal, Canada: Robt. Mitchell Co., Ltd.

New Jersey: A. A. Griffing Iron Co.

Buffalo, N. Y.; W. A. Case & Sons.

Rochester, N. Y.: Samuel Sloan & Co.

Syracuse, N. Y.: Pierce, Butler & Pierce.

Geneva, N. Y.; The Herendeen Mfg. Co.

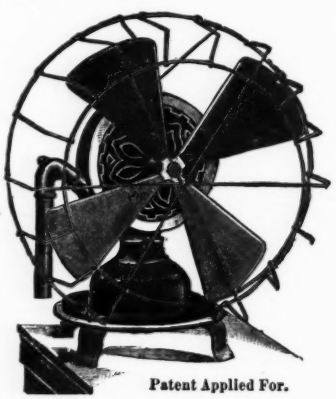
New York City, N. Y.: Colwell Lead Co., John Simmons Co., John A. Murray, A. A. Griffing Iron Co., Frank C. McLain; the Eaton, Cole & Burnham Co.; J. B. Clow & Sons; Manning, Maxwell & Moore; Judson A. Goodrich Co., Phelps Bros., Thos. R. McMann and J. M. Peck & Sons.

They want to know how this is for a starter, and whether this is not a record for the first year which shows their goods not only to be of standard quality, but at the right price. They know that "Domestic Engineering" is taken and read in every jobbing house in the United States and Canada, and that is the reason they wish the others to follow suit.

R. H. Watson, Philadelphia, has some work on hand in which he is using Cooper's closets.—Adv.

Triumph Water Desk Fan

Manufactured by the Specialty Mfg. Co., of Indianapolis, Ind., and, as its name indicates, operated by water power and can be used on the ordinary house service and waste, and requires only 1-16 in. jet of water to operate it, and gives satisfactory service on as low as 30 lbs. and all pressures above. This fan is neat,



Patent Applied For.

attractive and efficient, is just the thing for offices, dining rooms, bed rooms; in fact, wherever the cooling breeze of a fan is desirable. This fan is inexpensive and costs but little to operate. It can easily be fitted up with rubber hose (if so ordered, for service and waste. The company make other patterns of water fans, also water motors, cooling fans for belt power, etc. and if you are in need of anything in this line would advise you to write for their illustrated catalogue and prices.

R. H. Grant, Wilmington, N. C., is plumbing a residence in which he is using Cooper's Nautilus closet.—Adv.

Acetylene Gas Feature Wins.

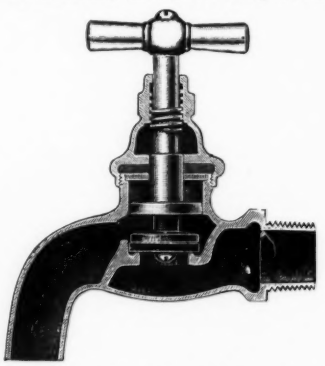
A standard work, with an added department on a timely and popular subject, is the new edition of "Hot Water Heating, Steam and Gas Fitting; Acetylene Gas, How Generated and How Used," by James J. Lawler and George T. Hanchett. Lighting by acetylene gas is one of the most practically interesting themes before the trade and the public at large to-day. The portion of the book devoted to this topic is copiously illustrated, and treats the subject in an exhaustive manner, having the rare merit of covering the whole ground from an impartial and disinterested standpoint. The sale which "Domestic Engineering" has had for this book is considered by the publishers of the work to be truly phenomenal.

C. S. Thompson, Atlantic City, has some work on hand in which he is using Cooper's goods.—Adv.

A Noiseless Bibb.

One more noiseless bibb has come to light. The manufacturer of this one, however, has faith enough in it to say that he will take back any that are not all he claims for them. There is nothing to rattle in the way of a loose disk, and they have stood a severe test with a flimsy washer

There is a guide on the stem which runs in a finished cylinder in the body, serving the double purpose of holding the stem steady and preventing the rush



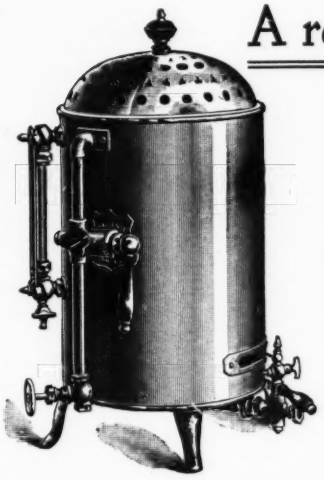
of water around the packing. A single washer packs both stem and shield. This may be pressed more firmly into place at any time by tightening the shield, without removing any of the parts. This shield is put on with a very fine left-handed thread to prevent its becoming loosened when the bibb is opened to its full capacity.

These bibbs are put up in a variety of styles, under patent applied for by the J. B. Campbell Brass Works, Erie, Pa. Write them for a catalogue, and mention "Domestic Engineering."

Henry Jackel, Philadelphia, has two fine operations on hand in which Cooper's goods are being used—Nautilus closets, lavatories, baths, etc.—Adv.

The Century Water Lift.

The Century Water Lift, the latest design of the L. E. Rhodes Co., of Hartford, Conn., is a strong and finely fitted water-motor pump made entirely of brass, and adapted to any of the various methods of connecting, either for the automatic distribution of cistern water through a house or for the increase of the city pressure. Absolute reliability and long wearing qualities, together with a maximum of efficiency, are obtained by its scientific construction. It has a really perfectly balanced motor valve,



A record breaker

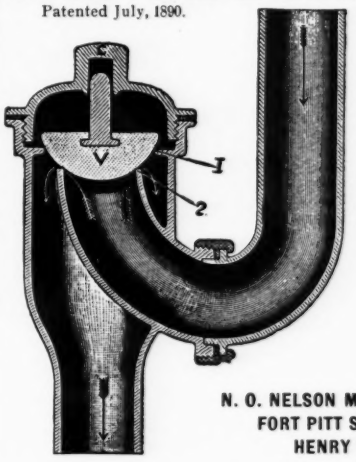
Boils water in 1½ minutes

This heater with gas attachments for heating water to a high temperature with unequalled rapidity and economy cannot be surpassed by any heater on the market. Adapted for bath rooms, etc. Send for catalog.

Challenge Mfg. Co.
South Norwalk, Conn.

THE SECURITY TRAP

Patented July, 1890.



Seal: Cannot be reduced in any degree by most severe syphonic action.

Evaporation: Ball rests in such a way that it is impossible for water to evaporate.

Back pressure: Positively safe against it.

Noise: No roaring.

GET PRICES.

WM. A. MUNDY
211 S. Ninth St.
PHILADELPHIA, PA.

N. O. NELSON MFG. CO., St. Louis, Mo.
FORT PITT SUPPLY CO., Pittsburg, Pa.
HENRY McSHANE MFG. CO., Boston.

Fig. 52

House Force Pumps

FOR KITCHEN SINK USE.

These pumps are adapted to a variety of purposes and are constructed as a compact, yet powerful hand force pump, especially intended for house use in forcing water into an upper story or storage tank. Made with polished iron, brass lined or all brass cylinder.

Fig. 53 is also furnished with brass tube cylinder, cylinder cock spout, brass piston rod, and stuffing nut highly polished and nickel plated, making one of the handsomest pumps ever put on the market.

A. Y. McDonald & Morrison Mfg. Co.

Established 1856 **DUBUQUE, IOWA**

Fig. 53

Here's an "Eye Catcher"

IT'S A CUT—one of the sort of illustrations we are making every day for advertisements, booklets, catalogues, etc. We make them in half-tone or line, from photographs, drawings, or direct from the articles. We have a plant and a force that give our customers great advantages in quality, time and cost.

Send for Specimens and Prices.

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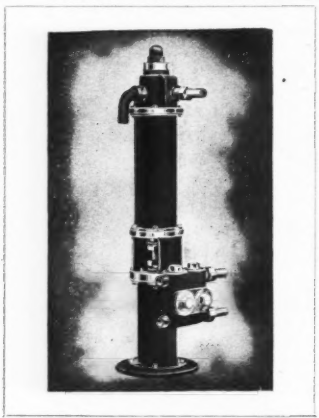
that is thoroughly patented and has been used for years on the leading organ motor of the country. With this valve action the motor cannot stick or short stroke, no matter what the water pressure, and the lift can be confidently relied upon to run smoothly and effectively for years, producing a steady flow of water without needless waste. All moving parts of the motor are directly in line with the center of the piston, and there is no side strain to wear the pack-



ings or any other parts unevenly. It should be particularly noticed that this lift will deliver a large volume of water in proportion to its size. It is intended to meet all ordinary household demands, and the motor works so smoothly that it can be run at a speed higher than is attempted by competing lifts. The pipe connections are all half inch iron pipe size, but the lift will easily supply, under average conditions, a three-quarter or a one-inch pipe. The motor valve or any of the pump valves may be taken out by simply unscrewing the cap that covers it, without moving the machine or any of the pipe connections. The pump is carefully arranged, so that there can be no catching of the valves, and so that the cistern water will pass freely. The pump valve-seats can be easily renewed.

All these features, backed up by accurate workmanship and the best of material, produce a lift that does the most effective work without trouble of any kind to the owner, without noise or waste, requiring no oil and with no slide valves to "dress." It is made by a concern which builds a larger variety of piston water motors than any in the country and which backs up its promise when it says of the Century Lift "complete satisfaction guaranteed."

W. J. McGuire, Toronto, Ont., has some fine work in Montreal in which he is using three of Cooper's Nautilus closets.—Adv.

Triumph Exhaust Fans.

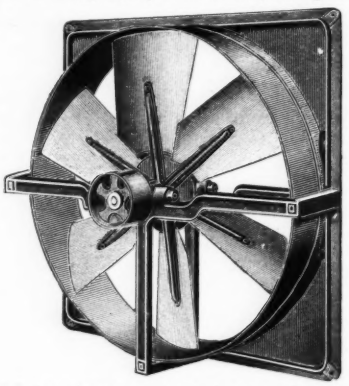
The accompanying cut represents the Triumph exhaust fan for belt service, manufactured by the Specialty Mfg. Co., of Indianapolis, Ind. This fan is made for strength, durability, efficiency and convenient installation. As to the latter feature, to install this fan, it is only necessary to place this fan with the flat back against the window or opening and lay or bolt to frame or casing and the installation is complete, as the fans are shipped assembled, just as shown in cut above. No expensive frame work or stand to be built; no expert mechanic required to install it.

This is the only fan made having flat square back, adjustable self-oiling and self-aligning boxes, with phosphor bronze (not brass) bearings. To those acquainted with and having any knowledge of bearings, it is useless to say that this is the best bearing it is possible to make; it will outlast a dozen best babbitt bearings. The majority of fans have babbitt bearings, and the balance only cast-iron. As the bearings of a fan constitute all the wearing parts, it necessarily follows that the real value of a fan should be determined by the bearings. The Triumph exhaust fan, being the only fan made with these high grade bearings, it is surely the best fan.

This fan is so constructed that it is perfectly rigid and free from any vibration, from which fact it may be run at almost any speed without any risk of racking. The efficiency of this fan is greater than any other fan, as the same result is accomplished with less consumption of power.

This fan is built for hard and continuous work and will in every case render satisfactory service.

This fan is best adapted for removing steam, dust, heat, foul odors, dampness,



etc., from any and all kinds of rooms, apartments, basements, etc.; is the best fan made for dry kilns or dryers of any kind, and for specific and general ventilation, especially when it is desirable to move large volumes of air. A complete illustrated circular and discounts sent on application, mentioning "Domestic Engineering," to the Specialty Mfg. Co., 400-402 S. Meridian street, Indianapolis.

Grant, Jenkins & Co., Philadelphia, are plumbing the residence of, Philip Hauck, using Cooper's goods throughout.—Adv.

Two New Torches.

The Clayton & Lambert Mfg. Co., of Detroit, Mich., have sent us electros showing two new torches that they have recently added to their line. We are pleased to call our readers' attention to them. The No. 11 is an alcohol torch and is a little beauty. The tank is drawn out of heavy brass and is free from seams, size being ⅞-in. in diameter and 6-in. long (just fits the vest pocket). The top and burner screw on, making a tight joint. The blow pipe is adjustable, screwing up or down on burner tube. A screw cap is provided to close the torch air tight when not in use, thus stopping evaporation and saving expense and trouble of filling it each time it is needed. It is nickel-plated all over, and is highly finished. The makers warrant it to suit you.

The No. 12 torch burns either gasoline or alcohol. It is made on new principles by which the air blast is passed through a chamber charged with gasoline or alcohol gas, which makes a much stronger fire than can be had in any other way. When blow tube is not used the torch makes a fine candle, which the user will find valuable when working in dark places. A hook is provided so that it may be hung up. The No. 12 is well

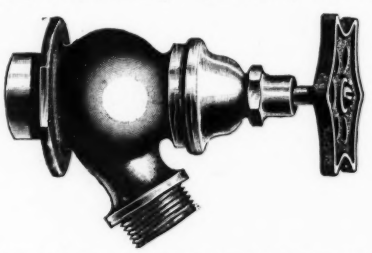
CLAYTON & LAMBERT MFG. CO. No. 11 DETROIT, MICH. U.S.A.
CLAYTON & LAMBERT MFG. CO. No. 12 DETROIT, MICH. U.S.A.
CLAYTON & LAMBERT MFG. CO. No. 12 DETROIT, MICH. U.S.A.

made, all parts being brass, nickel-plated, and finely finished all over, size being ⅞-in. diameter and 6-in. high—just fits the vest pocket. As this torch does first-class work using gasoline for fuel, which is much cheaper than alcohol, it will save its cost in a short time in the saving of fuel alone. The makers warrant any fire made by them to please the user. Your name and address on a postal card asking for further information, will bring full description of all their fires and a booklet valuable to users of gasoline fire pots or torches. In asking for this booklet please say you saw it in "Domestic Engineering."

H. B. Bailey & Bro., Plymouth, Mass., are remodeling in a residence, using Cooper's Nautilus closet.—Adv.

A New Sill Cock.

We present to your notice a new sill cock with several commendable features. The hose end is set at an angle to save the hose from wearing rapidly at the point where it joins the coupling. The seat is stationary and raised, so that



there is no chance for it to become loosened or left on the pipe when the body is removed. The flange is flattened on opposite sides to admit of the use of an ordinary wrench without marring the body. These cocks are made up with either wheel or key, and are manufactured under "patent applied for." For other particulars apply to the J. B. Campbell Brass Woorks, Erie, Pa.

Campbell & Lewis, Watertown, N. Y., have some fine work on hand in which they are using Cooper's Nautilus closet.—Adv.

Improved Steam Pressure Regulator.

We illustrate herewith the improved pressure regulator manufactured by Julian D'Este Company, 24 Canal street, Boston, Mass. The operation of this pressure regulator is as follows: The sectional view shows a main valve operated by a loose-fitting piston; a secondary valve in the top of the chamber over the piston; a metallic diaphragm (performing the double office of operating the second-

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CAST-IRON SOIL PIPE
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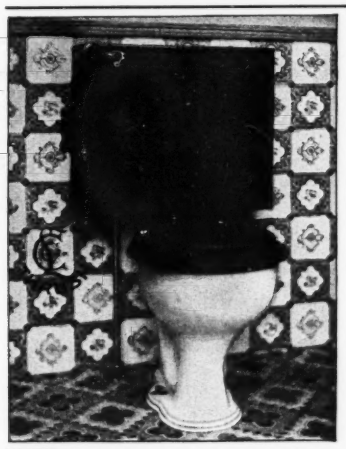
IMPROVED BATH-ROOM FIXTURES



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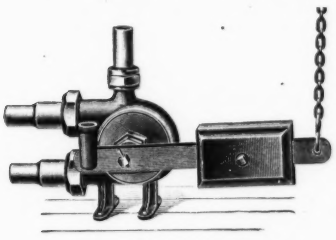

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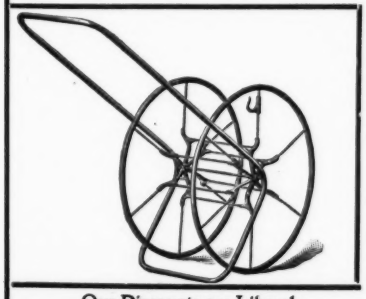
WIRT'S ALL IRON HOSE REELS



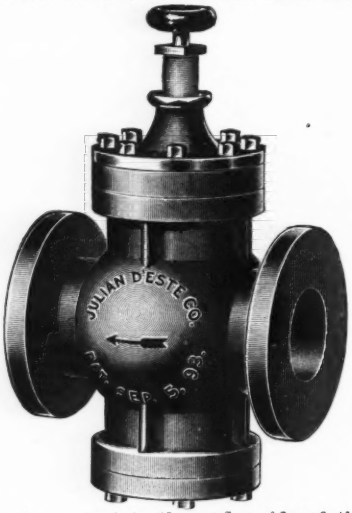
Are cheaper than Wooden Reels. They look better, last longer and give better satisfaction. They are the best for all purposes. Wirt's Wall Reels and Hump Racks for fire protection.

Wirt & Knox Mfg. Co.
219 N. Third St.
PHILADELPHIA, PA.

Our Discounts are Liberal

The best pump in the world cannot lift water from a dry well, but there is water down lower and a dry time is the best time to dig for it.

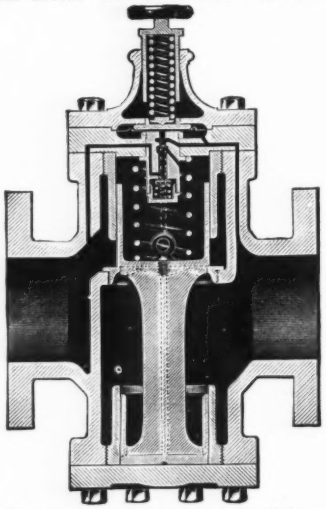
ary valve and making a joint to the cap which contains it), and a side passage connecting the chamber under the diaphragm with the outlet. When the spring over the diaphragm is compressed the diaphragm gives way, and thus opens the secondary valve upon which it rests, allowing the steam to escape from the upper side of the main piston valve into the low service, and at the same time



opening a port to the under side of the piston, admitting full boiler pressure, which lifts the main piston valve open to its full capacity.

The main valve remains open until the back pressure, communicated from the outlet through the side passage, is sufficient to raise the diaphragm and thus close the secondary valve, shutting off high pressure from the bottom of the piston; then the high pressure steam or water fills by the loose-fitting piston, in the space on top of said piston, and forces it on its seat, thus uniformly maintaining the pressure at which it is set.

The purposes to which it may be applied are as various as the wants of steam users. The most common and ob-



vious is in steam heating where it is used to reduce any varying high pressure to any constant low pressure that may be desired.

By its use steam may be maintained in the boilers at high pressure sufficient to run a steam engine or elevator and yet be reduced for heating to two or three pounds, thereby entirely preventing the snapping and cracking in radiators and heating-pipes which is so disagreeable and dangerous, also preventing the wear and cutting of the seats of the globe valves.

Further information and price lists will be cheerfully furnished by the manufacturers if you write, mentioning "Domestic Engineering."

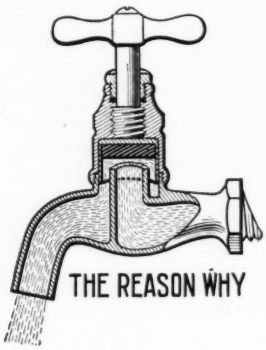
Cooper's Atavic flushing valves are being used in the new restaurant being erected for Childs in Philadelphia.—Adv.

FAUCET ON A NEW PRINCIPLE.

The average compression bibb has faults which are the cause of many complaints.

The Apex faucet, by a radical change in the construction of working parts, overcomes these faults.

A tubular seat extends above the body and is accessible when the bonnet or cap is removed—allowing the removal of any inequality caused by wear (with a flat file).



This extended tubular seal is enclosed by an independent cap—the pressure of water lifts the cap, which in turn forces the flow downward through the nozzle and prevents any pressure from reaching the stem. A special composition washer impervious to hot or cold water slips into this cap. All small nuts and threads are dispensed with—and there being no top washer or packing required the faucet always turns easily and quickly and never a leak. It is manufactured by Homer Brass Works, 231 Race street, Philadelphia, Pa., who will gladly furnish further information upon request, mentioning "Domestic Engineering."

THE WINCHESTER HEATER.

Among all the heaters on the market the "Winchester" has as consistent a reputation as any. A good heater to start with, it has not been necessary to improve it by changing the patterns or altering the principles of its constructions. It has been found a good seller by steam and hot water fitters scattered all over the eastern states, and in New England

its strength is simply phenomenal. There is no doubt that a contractor who has the agency for the "Winchester" heaters has an asset of considerable value in his business. Terms for agencies may be had by application to the Smith & Thayer Co., Boston, Mass., if you mention "Domestic Engineering."

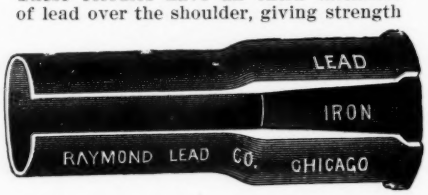
TO STAY IN GENEVA.

The Vance Boiler Co., of Geneva, N. Y., has officially announced its intention of staying in Geneva, reports to the contrary notwithstanding, and has confirmed the report of the purchase of seven lots in the Torrey Park division. On these lots, covering an acre and a half of ground, the company will construct a new plant, which will enable them to take care of all orders coming their way. Hitherto they have been seriously hampered at times by want of space and facilities for work. The new factory will be equipped with up-to-date machinery, and will give employment to several hundred men. It is conveniently located, and will have switch connections with the Lehigh Valley and Central-Hudson railways.

D. F. Keefe, Watertown, N. Y., has an operation on hand in which Cooper's Nautilus closets are being used.—Adv.

THE RAYMOND FERRULE.

We show herewith the combination ferrule as manufactured by the Raymond Lead Co., of Chicago, for making reliable connections between lead and iron pipes. These ferrules have an extra thickness of lead over the shoulder, giving strength

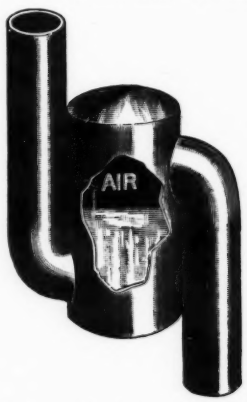


to the ferrule where it is needed. Upon application to the Raymond Lead Co. prices on this line of ferrules, together with a price list of lead pipe, etc., will be sent if you mention "Domestic Engineering."

O. Hanratty, Springfield, Ill., has some fine work on hand in which he is using Cooper's Nautilus closet.—Adv.

THE CLEAN SWEEP TRAP.

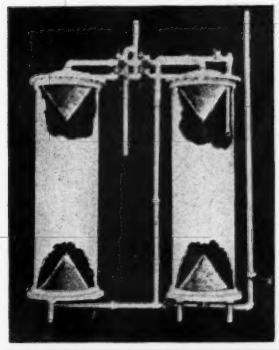
The Detroit Sanitary Supply Co., Detroit, Mich., is certainly to be congratulated upon their success in placing the Clean Sweep trap upon the market. They themselves recognize that the trade is to



a very large extent responsible for the large sale of the trap, as it has been received by the plumbers with open hands and has been used by them most freely. Upon application a catalogue with prices and discounts will be sent, if you write to the manufacturers, mentioning "Domestic Engineering."

Wm. Bodenstine, Philadelphia, is remodeling the plumbing in the residence of Mr. H. B. Cathers, using Cooper's goods throughout.—Adv.

THE ECLIPSE DUPLEX FILTER



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No Alum or Coagulent used for Clarifying

Send for catalogue and hundreds of references on the best filter made in the U. S.

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WE CAN SAVE YOU MONEY

Cooper's Adjustable Drain Trap

Has a 4-inch Seal and is an absolute protection against Sewer Gas. $1.75 to $2.00 SAVED ON EACH TRAP. Write and we will show you how to make money.

Libbey, Parker & Co., = Boston

Sales Agents for Libbey Drip Valve, Victor Ball Cock and Victor Brass Pipe Hanger.

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RELIABLE TINNERS' FURNACE

MADE BY

The SCHNEIDER-TRENKAMP Co., Cleveland, Ohio.

SOMETHING NEW

Vanderman's Adjustable Fitting for Connecting Soil Pipe

Send for Catalogue and Price List of Plumbing and Heating Specialties, or order through your Jobber.

Freight allowed on the Adjustable Fittings, East of the Mississippi river, on a dozen of one or assorted sizes.

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The "Wilhelmi" is a high grade copper range boiler tested to 250 lbs. There can be no better boiler made : : : : : :

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Very attractive discounts furnished

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ROOF FLANGE

No. 1. will adjust from ¼ pitch to ½ pitch
No. 2. will adjust from flat to ⅓ pitch

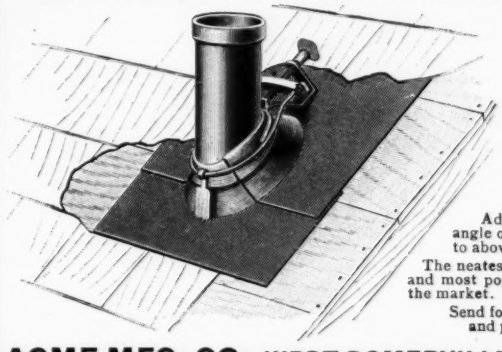
Made for Standard and Extra Heavy Pipe in copper and Galvanized Iron. Only two sizes to be carried in stock as the adjustments fit all angles.

For Prices, etc., apply to

KENDRICK VALVE AND WASHER COMPANY,
SYRACUSE, N. Y.

The above cut shows our No. 1, ¼ to ½ pitch

HAVE YOU SEEN IT WORK? IT IS A MARVEL.



Two-Part Acme Roof Flange

Adjustable to any angle of roof from flat to above 45 degrees.

The neatest, most unique and most popular flange on the market.

Send for catalog and prices.

ACME MFG. CO., WEST SOMERVILLE, MASS.

SOME PRICES YOU SHOULD GET.

This spring promises to be the most active building season the trade has known for many years, and more plumbers are in the market for business than has been the case for some time. When business is good is the best time in the world to be careful about buying, so we recommend when you want enameled, roll rim kitchen sinks, enameled corner and flat back lavatories, lavatory traps, brackets, supply pipes, bath supplies, nipples or plumbing brass goods, that you should write to the Humphryes Manufacturing Co., Mansfield, O., mentioning "Domestic Engineering."

THE TRIMO PIPE WRENCH.

We illustrate herewith the Trimo pipe wrench, as manufactured by the Trimo Manufacturing Co., of Roxbury, Mass. It will be observed that this tool has a movable jaw, and that the stronger the pressure is put on the handle the tighter the grip will be on the pipe, which makes it impossible for it to slip off or lose its hold. Its bite is certain, positive and secure, while it releases itself quickly

and easily. It is made in all the various sizes desired, and is of drop forged steel. It has taken its place among the best goods of its kind on the market, and is as well known as any wrench, but there is always coming to the front a new generation of workmen who must be educated in the use of good tools. Hence we recommend the readers of this paragraph to send for a catalogue and get prices on this and other useful tools. In doing so please mention "Domestic Engineering."

W. H. Spellman & Co., of New York, are plumbing the Yale Club building, using Cooper's brass work.—Adv.

THE EXCELSIOR GREASE TRAP.

We illustrate herewith the Excelsior grease and sewer gas trap, which is so well and favorably known to plumbers. The success which the large size achieved has lead Sproul & McGurrin, of Grand Rapids, Mich., its manufacturers, to make a smaller size, designed for private residences, the large size being used in hotels and restaurants, or where large quantities of greasy water are being dis-

charged. The large size is known as the No. 1, and is 18 inches long, 12 inches wide and 10 inches deep. The smaller size, the No. 2, is 12 inches long, 8 inches wide and 9 inches deep. They come either painted or enameled inside, and if desired can also be had enameled inside and outside. Upon application to the manufacturers circulars giving price list and discounts will be sent, if you mention "Domestic Engineering."

John C. Gunzer, Chestnut Hill, Philadelphia, is engaged on some work at Mt. Airy in which Cooper's baths, closets, etc., are being used.—Adv.

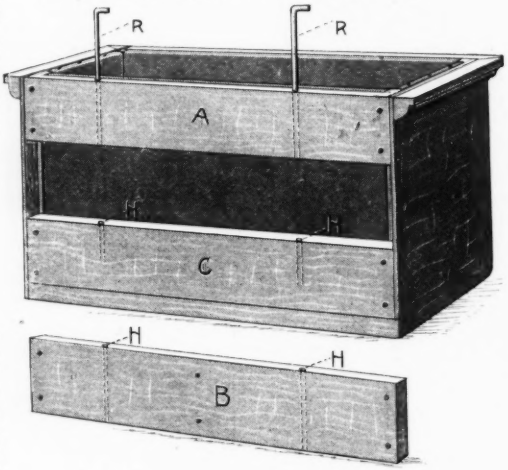
SPECIALTY CEILING FAN FOR BELT SERVICE.

The above cut shows a ceiling fan for belt power, made by the Specialty Mfg. Co. This fan is neat, ornamental and serviceable, is especially designed and suitable for store rooms, offices, fac-

tories, etc., when power is at hand; or these fans may be run by a water motor, the manufacture of which the above company makes a specialty, making various sizes, suitable for almost any machine, from a family sewing machine up.

AN "EASY-PUT-UP TANK.

William Heap, of Muskegon, the veteran manufacturer of plumbers' woodwork, has devised a new tank which is going to be a great favorite in the trade. We illustrate it herewith, the illustration showing a back view of the tank, permitting its constuction to be easily understood. The back is made in three sections, A, B and C. Sections A and C being securely fastened to the tank body. Section B is removable, and in the illustration is shown removed from the tank. Through these three sections are bored two holes from top to bottom, marked on the illustration H H. Into these two holes fit two one-quarter-inch rods, marked R R, which are shown in this cut partly withdrawn. These rods securely fasten the piece B to the pieces A and C. When the tank is shipped, the section B is fas-



tened into the back of the tank by means of the two iron rods, R R. When the plumber is ready to put the tank up, he removes the two rods, thus releasing the middle section B. This section is then securely fastened to the wall by nails or screws. Studdings are always 16 inches from center to center, and as section B is 18 inches long, there is always a studding to which it can be fastened. When the tank is placed against the wall, the section B readily fits into the space from which it was removed. The two iron rods are then dropped into the holes at the top of the tank, pushed down through A, B and C, and the tank is firmly fastened to the wall.

It is as easily taken down as it is put up. By unscrewing the couplings of the valve and ball-cock and taking out the two iron rods at the back of the tank, the tank is free from the wall. The advantages of these tanks are these:

The tank is put up in half the time it takes to put up brackets and it will hold five times as strongly.

When brackets are used it is very seldom a studding can be found just where the brackets should be placed, thus lath and plastering have to be relied upon to fasten the brackets to.

If both brackets are not put up exactly in line, the tank is put up crooked.

Brackets soon rust and become unsightly.

We anticipate a very large sale for this "Easy-Put-Up" tank. It is already being sold by leading jobbers and to master plumbers who do not find it in their jobbing houses, if they will write a postal card, mentioning "Domestic Engineering," William Heap, Muskegon, Mich., will write what jobbers do handle it.

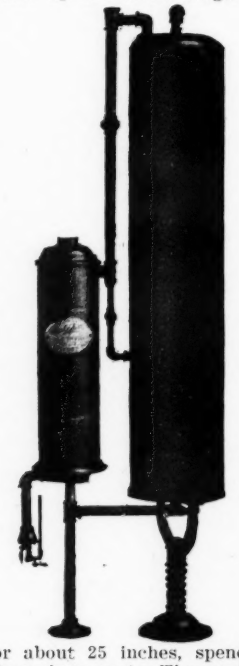
F. W. Gleason & Co., Hyde Park, Mass., recently set some of Cooper's special baths in a residence in that city. —Adv.

THE ECLIPSE ROUND WATER HEATER.

Here are some advantages of this heater:

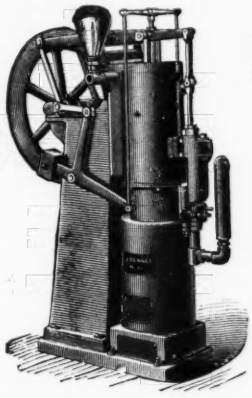
Under the most severe tests it shows from 35 per cent to 50 per cent greater efficiency than other styles.

From a specially constructed burner placed under the ends of the pipe, the heat passes up the entire length of the



pipes, or about 25 inches, spending its entire force in ascent. The products of combustion passing out of the flues are but little warmer than the surrounding air, showing that all the heat units are absorbed.

Special machinery has been made, so that these heaters are placed upon the market at a very low price; in fact, at such a price that every dealer in plumbing and heating supplies should become familiar with them. A catalogue, de-



Denney Improved

Rider and Ericsson

Hot Air Pumping Engines

Embody the very latest Improvements in Design and Construction.

The Most Reliable and Economical Engines for Pumping water.

Use any kind of fuel.
Can be operated by anyone.

Perfectly Safe, Noiseless,
Ever ready for Service

Built for years by

American Machine Co. WILMINGTON, DELAWARE

Agents Wanted in the West.

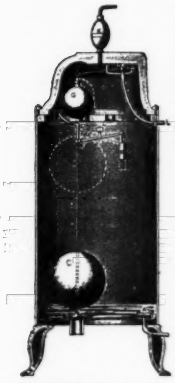
The Victor Supply Co.

Manufacturers and Jobbers of

Plumbers' Gas and Steam Fitters' Supplies

Write for Prices when in the Market.

Springfield, Ohio



PATENTED DEC. 4, 1894
PATENTED OCT. 15, 1895

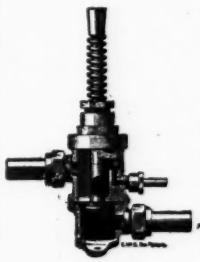
Philadelphia Says It is the Best Beer Pump Made——

And our pamphlet tells why it is the only beer pump sold in town where it's made. We make attractive terms to our agents. Write us.

I.X.L. Pump Company

1015 Christian St., Philadelphia.

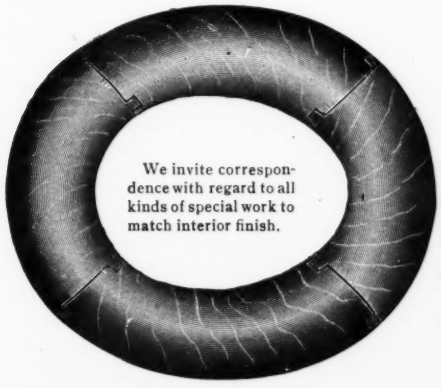
Self-Acting Hopper Valve



Very simply constructed. Has only one flat washer on inside. Repaired easily with pair of plyers. Does not hammer. Waste drains whole body of valve. Cannot waste when running. We give a very liberal discount to the trade and want agents.

The G. McG. Mfg. Co.

The G. McG. **1015 Christian St., Philadelphia, Penn.**

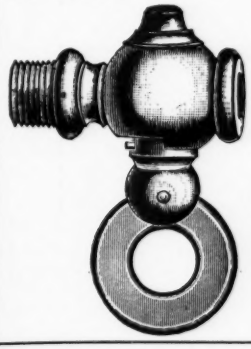


THE BEST PLUMBERS' WOODWORK MADE.

We make special orders in all fancy woods, such as Mahogany, Bird's Eye Maple, Sycamore, Black Walnut, etc.
We make drain boards in a superior manner, and invite sample orders.

H.B. Olmstead & Co.
87 Frankfort Street
NEW YORK CITY

Balls, Bodies, Binding Posts, Bushings, Caps, Cocks, Nozzles, Gas Stove Fittings, Nipples, Swings, Screws, Nuts, Wire Connectors Electrical Goods Etc., Etc. SPECIAL TURNING TO ORDER.



United Metal Mfg. Co.

525-527 Broome Street, New York

Manufacturers of

Gas, Electric and Combination Fittings

FROM BAR METAL

WATER SUPPLY WITHOUT WATER MAINS

The Kirtley Patent Domestic Water Service supplies country, village and suburban homes, business and public buildings with water supply where water mains are not accessible. Greatly increases a plumber's chance to do business. Write for descriptive circular.

GEO. P. KIRTLEY & CO., 1213 Walnut Street, Kansas City, Mo.

INTERNATIONAL SPRINKLER CO.

517 ARCH STREET, PHILADELPHIA, PA.

PRES., CLARKE MERCHANT
(Pres. of Merchant & Co., Inc.)

COMPLETE INSTALLATIONS MADE

"International" Head

THE BEST

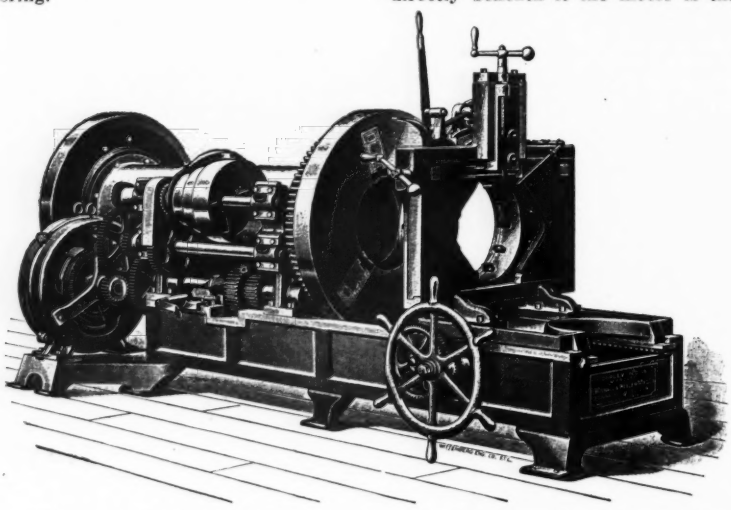
The Company has a *complete equipment* for both the WET AND DRY SYSTEMS of Automatic Fire Extinguishers.

Its devices are fully protected by the U. S. Patent Office; and have the *full endorsement* of the *Insurance Companies*.

The "International" Head is in all respects the *best* on the market.

It is the *simplest, most reliable, most certain and most effective*. From *20 to 70 per cent. of cost of insurance saved* by putting "International" Sprinklers in your *foundry, factory or store*. Write for full particulars.

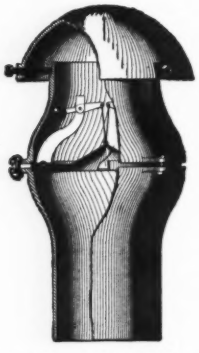
scribing these goods and giving discounts to the trade, will be sent upon application to the Eclipse Gas Stove Co., Rockford, Ill., if you mention "Domestic Engineering."



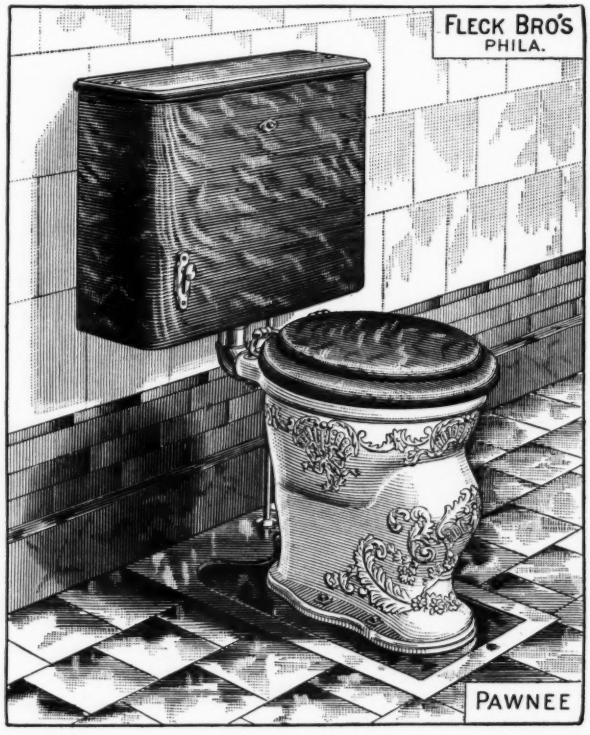
E. S. Haines, Auburndale, Mass., have some work on hand in which they are using Cooper's specialties.—Adv.

FRESH AIR INLET.

When a sanitary device is of such value that it is adopted by the building department of such a city as Greater New York, it can be taken for granted that it is a good thing. The fresh air inlet illustrated herewith is a scientifically constructed device which automatically governs the inlet of fresh air into the house drainage system. Plumbers will find this a good device, and upon application to the Hart-Ayres Plumbing Co., Fourth avenue and Degraw street, Brooklyn, N. Y., description and price list will be sent.



We show an electrotype of a machine the Bignall & Keeler Manufacturing Co., of Edwardsville, Ill., have just recently shipped to the United States Naval Academy at Annapolis, Md. This machine, as you will notice from the sketch is equipped with a motor directly attached. The machine is what is designated as the Duplex No. 16, which has a standard capacity of from 7 to 16 inches inclusive, although this special machine was designed to take 6-inch dies also. The motor used was ten and two-thirds horse-power Sprague motor of the Lundell slow speed type. You will note that the machine is also designed so that it can be run with a countershaft and belt. In fact, either drive may be used. By sliding the gear on the outside end of the cone pulley shaft out of mesh with the large gear directly beneath it the motor is thrown out of gear entirely and the machine can thus be driven direct from the countershaft. In case you wish to use the motor, this gear can be placed back in position, the belt thrown off the pulley and the motor used to drive the machine.



If it is desired to drive some other machine in the shop, it can be belted direct from the cone pulley or any other tool that may be substituted and run at the same time the pipe machine that is being operated. If it is desired to operate this other tool and not the pipe machine, the two gears immediately adjoining the cone pulley can be thrown out of mesh and the pulley will revolve without driving the arbor of the machine. The motor is of the variable speed type, and the controller furnished with the motor will give twelve different speeds. The compound gear on the machine is arranged to give two speeds to the arbor for each speed of the motor, therefore giving twenty-four speeds for the arbor.

The inside diameter of the arbor is 1⅞ inches, which will admit of 16 inches outside diameter pipe with a coupling on the end.

The die stand is of their improved Peerless die head adjusting mechanism. This, of course, is not plainly shown on the cut. There are twelve chasers to each set of dies. These measure 15-16x 1¾ cross section.

The machine will weigh about 30,000 pounds without the countershaft. The company assures us that they believe this tool ot be the most thoroughly made of any on the mraket to-day, and that their work in this line has been appreciated, as they are continually receiving orders from such large users as the Crane Co., Jas. B. Clow & Sons, National Tube Co. and others. They have just completed two 18-inch machines for the Crane Co., and are completing an additional one for Geo. B. Limbert, Chicago. This machine will have a capacity of from 8 inches to 18 inches.

Oby & Co., Canton, O., have some work on hand in which Cooper's closets are being used.—Adv.

THE PAWNEE LOW-DOWN COMBINATION.

We illustrate herewith the Pawnee low-down water closet combination manufactured by Fleck Bros., 44-50 North Fifth street, Philadelphia, Pa., which is claimed by them to be noiseless in action, very effective, quiet in its working, and to rough in at 12 inches, which is the point desired by the plumbers. The quality of material entering into this combination is first class, and the price is said to be interesting. It will be divulged to you if you write, mentioning "Domestic Engineering."

J. E. Wood, New York, is remodeling the plumbing in a residence, using Cooper's Nautilus closet.—Adv.

Eagle Stills Sell Well

They look well, work well, wear well—better than others that cost more and do less. Sanitary. Self-purifying. Automatic. Simple. Three parts—retort, distillate reservoir and condensing dome. Skeleton pattern handles. Nickel-plated faucets. 9 inches high, 15 in. diameter.

TWO STYLES.

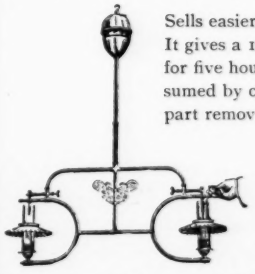
No. 9. Best Rolled Sheet Steel, heavily coated idside and outside with pure block tin, weight 3¼ pounds—$5 retail.

No. 11. Best Hard Rolled Solid Sheet Copper, pure block tin lining, weight 6 pounds—$8 retail.

Liberal Profit for Plumbers. Write

Health & Comfort Supply Mfg. Company
CINCINNATI, OHIO

The American Self-Lighting Lamp



Sells easier than any gasoline lamp on the market. It gives a 100 candle power light for less than 1 cent for five hours. It lights in one-fourth the time consumed by others, and with only one match. Every part removable and cleanable.

Approved by Underwriters

We want reliable Plumbers as Agents

The American Self-Lighting Lamp Company
PEORIA, ILL.

Powhatan
Roundway Brass Cocks

For gas, water and steam are especially good sellers because they are made right, wear well, and give satisfaction. They are convenient because the free open water-way makes it possible to pass a rod through the cock for the purpose of removing possible obstructions from the pipe.

Powhatan Brass & Iron Works
CHARLESTON, W. VA.

THE ONLY SANITARY WASTE

THE PURITY BATH & BASIN WASTES

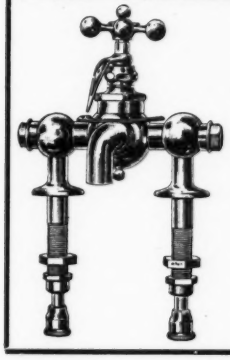
cut off the water in the Bowl or Bath from direct contact with the FILTH IN THE OUTLET PIPES.

Opens or closes with a touch,
Simple in construction,
No parts to get out of order.

FOR FULL PARTICULARS ADDRESS

THE H. M. WEAVER CO.
MANSFIELD, OHIO
New York Office: No. 81 Fulton St.

THE SODERLUND TWIN FAUCET



A COMBINATION HOT AND COLD WATER FAUCET WITH BUT ONE HANDLE. FOR BATHS, LAVATORIES AND SHOWERS.

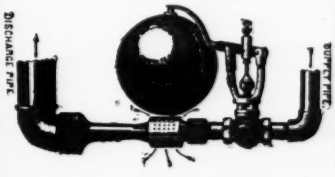
Its features Cannot leak; practically self closing; always operates; simple; indicator shows temperature of water being drawn; gives full force of pressure; serviceable; sells on sight.

For prices write

UNION BRASS WORKS
11 Hawkins Street
BOSTON MASS.

Automatic BRAENDER'S CELLAR DRAINERS

Operated by Water or Steam Pressure.



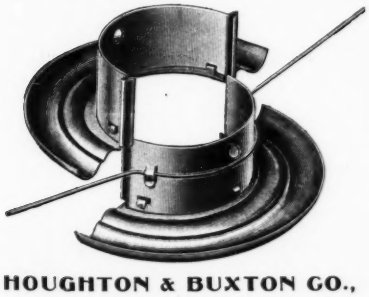
It is the Best, therefore the Cheapest

It is used in Municipal and U. S. Government Departments, endorsed by leading sanitary experts, and is guaranteed to do all that is claimed for it. Write for circulars and testimonials.

Sales Agents: W. N. McKenna, 73 Chestnut St., Boston, Mass.
J. E. Douglass, 40 Dearborn St., Chicago.

Sold to the Trade Only **PHILIP BRAENDER** 47 W. 125TH ST. NEW YORK.

THE H. B. PERFECTION CEILING PLATE



The only split plate that always stays in position; not affected by expansion of steam pipes; handsome and strongly made.

Will you ask for prices?

HOUGHTON & BUXTON CO., Worcester, Mass.

If We Save $200 a Year

by our heating apparatus for a customer of yours don't you suppose you will get more orders on that record?

J. J. Town, Des Moines, Ia., says our heater saves him $100 a year.
Chase & West, Des Moines, Ia., save $200 a year.
The Downing House, Oskaloosa, Ia., saves $200 a year.

We want your aid in selling these Heaters in a wider territory. Write us for terms.

IDEAL HEATING COMPANY
Des Moines, Iowa.

Geo. B. Shainline, Bridgeport, Pa., is plumbing the new residence of Dr. Harry in Norristown, using Cooper's closets, baths and lavatories.—Adv.

A Neat Present.

The well known jobbing house, R. C. McClure Co., Syracuse, are passing out to the plumbing trade a very neat souvenir in the shape of a celluloid and nickel-plated copper match box, very neat and handy to carry in the pocket. They are elaborately finished and on one side a work of art is depicted, consisting of a lady borne on the billows of a tempestuous sea.

E. C. Beck, Philadelphia, has some work on hand in which he is using Cooper's Nautilus closet.—Adv.

A New Roof Flange.

The Jacobs & Cooper Co., of Natick, Mass., have received word that a patent has been granted on the roof flange invented by their Mr. Cooper. They claim for the invention that it is an absolutely adjustable roof flange in every sense of the word, being designed to fit any angle of roof and also for use on the side of buildings. It does away with making a joint by pouring molten lead and, furthermore, requires no calking whatever. Nothing but a pair of hands and a monkey-wrench are required, and it is completed almost instantly. A bolt passes through and clamps the flange and two sections of soil pipe, thus allowing every piece, flange roof pipe and under roof pipe to be perfectly free and adjustable. The lead flange turns in and acts as a gasket to make a tight connection.

G. Wilbur Thompson, Newton Centre, Mass., recently placed a complete bathroom outfit of Cooper's make in a residence in his city.—Adv.

To Instal Mechanical Filtration Plant.

The N. Y. Continental Jewell Filtration Co., of New York, have ben awarded the contract for installing a 32,000,000 gal. (daily capacity) mechanical filtration plant at Little Falls, N. J., for the East Jersey Water Co. The construction of the plant will be under the direction of Geo. W. Fuller, C. E., 220 Broadway, New York.

Richard Ormrod, Philadelphia, has some work on hand in which Cooper's goods are being used.—Adv.

Buffalo Laundry Blower.

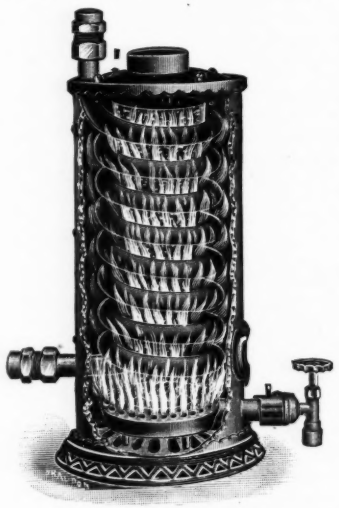
The Buffalo Forge Co., of Buffalo, N. Y., send us a small folder illustrating and describing their laundry blower with affixed countershaft. This is a small but important part of the equipment of a modern laundry, other devices for laundry use being the Buffalo system of heating, ventilating and drying, Buffalo disc ventilating fans for removing steam, and Buffalo automatic steam engines for power purposes.

New Connecticut Corporation.

A certificate of organization of the Anderson Coupling Company of Portland, Conn, has been filed with the secretary of state. The corporation is organized for the purpose of manufacturing Anderson's lead pipe expanding pliers and all kinds of plumbing, steam and gas-fitting materials and supplies. The capital stock is $12,500. The directors of the company are Charles H. Bill, E. Irving Bell and Andrew N. Shepard.

The Lightning Gas Water Heater.

This electrotype shows a section of the lightning gas water heater made by L. S. Lawson, of Homestead, Pa. It is made of the very best quality of seamless copper tubing with brass unions at the inlet and outlet pipes, which insures a well made and perfect joint. Its copper coil is ample for heating surface and it has a Russian iron asbestos lined jacket, combining the greatest heating efficiency with the minimum of gas consumption. The top and bottom pieces are of cast



iron. It is especially designed to take the place of the common water back and it will heat more water with less than one-half of the gas consumption. It furnishes an independent heating system which can be connected with the range boiler at a small cost or it permits the boiler in the kitchen to be done away with by putting it in the cellar, laundry or other convenient place and taking the heat out of the kitchen during the summer months. It can be installed at one-third the cost of water backs and affords an abundance of hot water at all times. There is no machinery to get out of order. Upon application to L. S. Lawson, Homestead, Pa., mentioning "Domestic Engineering," a more complete description with prices will be sent.

A. L. Hersum, Weston, Mass., is plumbing a residence in which he is using Cooper's Nautilus closets, baths, lavatories, etc.—Adv.

Get a Goodly Contract.

The Thomson Meter Company, of 79 Washington street, Brooklyn, N. Y., have taken the contract for supplying four hundred ⅝-inch meters for the city of Richmond, Va. The number of meters sold by this company to date is 181,534.

G. & E. Blake, St. John, New Brunswick, is installing three of Cooper's Nautilus closets in a fine residence in that city.—Adv.

"Guard" the Pancoast Ventilator.

Although the Pancoast International Ventilator Co. only opened their office at 43 John street, New York, November 1, 1900, the business has proven so satisfactory that larger and more commodious quarters are being looked for. The local and New England business is in charge of Percy E. Guard, and to his "hustling" is due the phenomenal success, although he claims "you only have to show a model of the "Pancoast" to the architects to get specifications, and the same little act brings the orders from the contractors."

Since opening the office he has made shipments to all parts of the world, amongst them being 150 assorted sizes to Honolulu; 20-28-in. to South Africa; 14-24-in. to South America; and several lots to Mexico.

For use in this country some of his largest orders are as follows: 66-18-in. for the Seaboard Air Line, for use on round houses; 7-48-in. for Keystone Varnish factory, Erie Basin; several 48-in. for Keratol Mfg. Co., Newark, N. J.; 8-28-in. special square for Public School No. 133, New York City, and several 24-in. for Hollywood Inn., Yonkers, N. Y.

The company is now at work on a new catalogue, which will surpass anything in the ventilator catalogue line ever issued by the Pancoast Company.

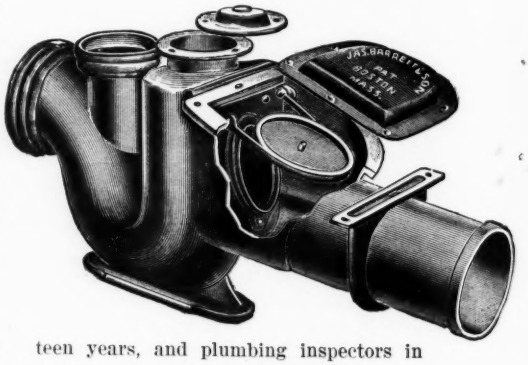
If you want to know all about a ventilator that does ventilate, drop Mr. Guard a line or call him up on the 'phone, 4256 John. He is certainly making things hum in the metropolitan district.

Reliable Attorneys.

Townsend & Decker, patent attorneys, 131 Broadway, New York City, appeal to the trade as experienced, reliable and practical men. H. C. Townsend was formerly a patent examiner, and D. H. Decker an assistant examiner in the United States patent office.

The Barrett Sewer Trap.

This illustration shows the Barrett sewer trap, which is placed upon the market with a view of its being the best trap that can be made. It has been used by the United States government for fif-



teen years, and plumbing inspectors in every section of the United States endorse it. Upon application, mentioning "Domestic Engineering," the manufacturers, Jas. Barrett & Son, 48-50 Pearl street, Boston, Mass., will send you discounts.

Of Interest to Sportsmen.

Mr. Tatham, of the firm of Tatham & Brothers, manufacturers of lead pipe, sheet and bar lead, as well as drop, chilled and buck shot, gave to the writer last week some very interesting facts regarding their chilled shot. In speaking of the relative economic value of chilled and soft shot when used with smokeless powders, he made the following statement:

"The killing pattern of chilled shot at ordinary distances is fully 25 per cent better than that of soft shot and the punctuation is much greater. The reason for this is that the effect of the explosion of the powder in the gun is less on the chilled shot, in proportion to its hardness, and it flies straighter and is less affected by the wind than if it were bruised or imperfect.

"Of course, the worst ammunition may sometimes, by chance, do good execution, but it does not pay to use it habitually,

THOMSON

Meter Company

79 Washington St., Brooklyn, N. Y.

25,145 Water Meters sold in 1899.

26,414 Water Meters sold from January 1st, 1900, to January 1st, 1901.

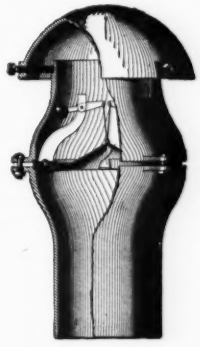
176,717 Water Meters sold to January 1st, 1901.

We Stamp our Meters only as they are sold.

The Ayres..... Fresh Air Inlet

PATENTED

Adopted by the Department of Buildings of Greater New York



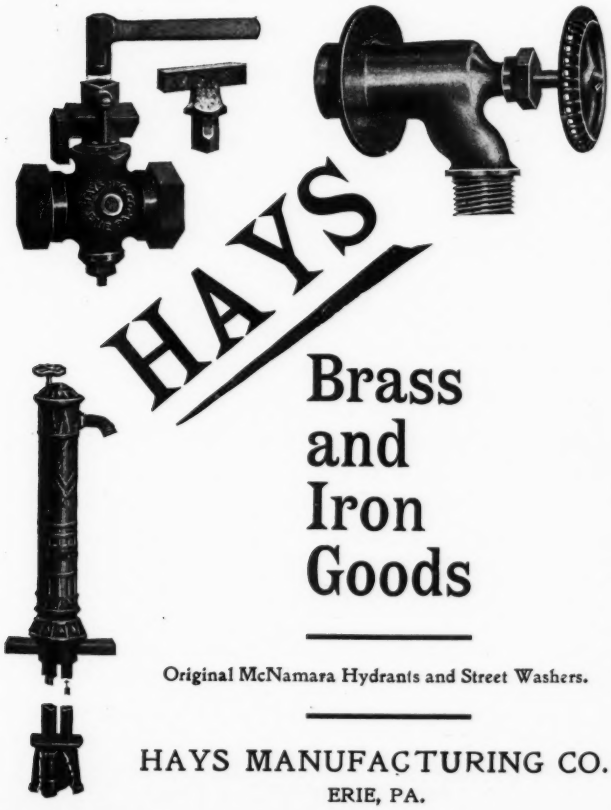
For Sale by Dealers in Plumbing Supplies only

MANUFACTURED BY

The Hart=Ayres Plumbing Co.

MANUFACTURERS OF PLUMBING SPECIALTIES

Fourth Avenue and Degraw Street, BROOKLYN, N. Y.



HAYS

Brass and Iron Goods

Original McNamara Hydrants and Street Washers.

HAYS MANUFACTURING CO.
ERIE, PA.

The Champion

Water Filters

ARE

Germ Proof and Give Perfect Satisfaction

MADE IN

FIVE STYLES AND FOURTEEN SIZES.

Secure a profitable Agency.

Catalogue and Prices upon application.

THE

Champion Safety Lock Co.

95 Woodland Ave., Cleveland, Ohio, U.S.A.

and as the price of first-class loaded shells cuts no figure compared with the satisfaction of making good bags or winning prizes, it may be readily seen that sportsmen can afford to pay whatever it costs to get Tatham's chilled shot.

"We have always maintained our reputation for making shot of the highest standard, and sportsmen will find they can kill with much greater certainty by using it. It is considered by sportsmen to be the best in the market, being harder, rounder, better polished, and more uniform than any other make.

"The extra cost of shells loaded with chilled shot is $1.50 to $2 per 1,000, but the increased chances of killing would be worth 25 per cent of the whole cost of the loaded shells."

Tatham & Brothers are to be found at 82 and 84 Beekman street, New York City.

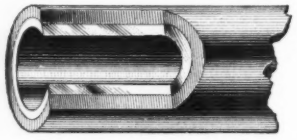
Stinson, Kennedy & Co., Pittsburg, Pa., are remodeling the plumbing in a residence in that city, using three of Cooper's low-down Nautilus combination.—Adv.

A New Composite Pipe.

A Boston publication has the following to say regarding a composite pipe which is about to be put on the market by the well-known manufacturers, Lamb & Ritchie. If they have succeeded in doing what is claimed, the trade will soon be in possession of what really may be termed a long felt want. It appears that Lamb & Ritchie made certain experiments with metals at their factory in Cambridgeport, Mass., which led to the discovery that they could make a composite pipe such as it had never been thought possible to make before.

It has always been recognized that, if only it were durable, block tin would be the best material for water pipes, and attempts have been made to secure durability by lining lead pipe with block tin, or by enclosing a block tin pipe in a wrought iron pipe. Tin lined lead pipe, however, not only is very expensive, but does not give all the needed strength or rigidity; while a tin pipe inside an iron pipe has always proved a failure, because the two separate pipes cannot be held together. In Lamb & Ritchies's new pipe, however, the two pipes, tin and iron, become one solid pipe and cannot be separated.

Although such a perfect union of tin and iron is found in tin plates, where iron or steel sheets are coated by dipping them in melted tin, a mere tin coating cannot be made sufficiently thick or reliable for water pipe. What is wanted is a real lining, which shall answer two apparently irreconcilable requirements. First, the lining must be inseparably united with the iron, like the coating on tin plate; and second, it must be thick enough to constitute a substantial and reliable tin pipe inside the iron pipe.



Both these requirements are said to be fully met in Lamb & Ritchie's composite pipe. The pipe may be bent, and even coiled, without injury and without tearing off the lining, and lengths of it, subjected to the powerful expansion and contraction of alternate heat and cold for more than a year, in hot water backs and inspirators, have stood the test without any separation of the two metals.

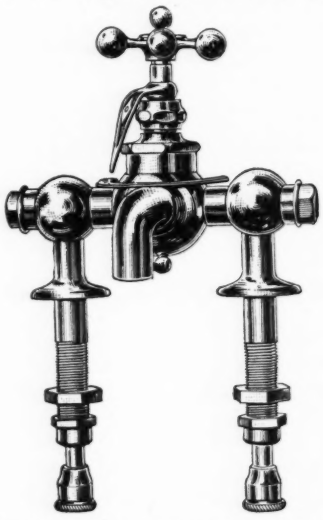
To protect the public from the dangers of lead poisoning and brass poisoning in drinking water is rapidly being recognized as of the greatest importance. Hitherto satisfactory devices have been lacking, or have involved too much cost; but with this new tin-lined iron pipe perfect security is attainable without any increase of cost

There are other uses besides the supply of drinking water for which this pipe is admirably adapted, and for mining and manufacturing purposes, or in cases where water does not attack lead, the wrought iron pipe is lined with lead. This results in a much cheaper pipe, in which, however, the lead is inseparable from the iron, and the strength and durability are greater than in lead, brass or wrought iron pipe alone.

LeValley, McLeod & Co., Elmira, N. Y., are plumbing a fine residence in that city, using Cooper's Nautilus closet with Atavic flushing valve.—Adv.

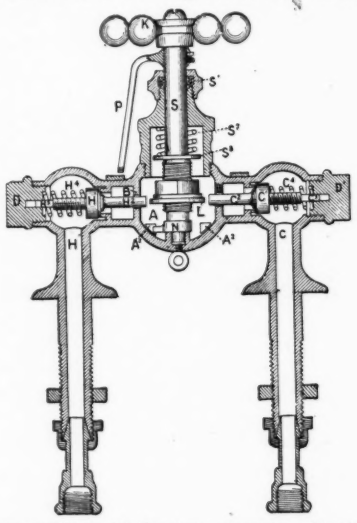
The Soderlund Twin Faucet.

"The Soderlund Twin Faucet," (patent allowed), manufactured by the Union Brass Works, Boston, Mass., is an entirely new departure in its line. It is



designed for use where hot and cold water is used, and a mixture of the two, at a temperature of any degree, between the two extremes is required. The two valves, one for the hot and one for the cold, are entirely free and work with the pressure horizontally. The handle is attached to a cam, which, as it is turned, comes in contact with one of the valve-stems, opening it gradually against the pressure. When the first valve is open to its fullest extent, the cam will, by turning the handle a little further, come in contact with stem No. 2, and a mixture of the two waters is obtained, and as you keep turning the handle the chamber receives larger flow from valve No. 2 and less from valve No. 1, until No. 2 is wide open, and as you continue to turn handle to a stop you gradually allow valve stem No. 2 to come to its seat with the pressure.

In operating this faucet you only make a half-turn with the handle; the same being a lever handle, you simply turn it from one side to the other. It has an indicator, which shows on a plate which way to turn the handle to obtain the temperature of the water required, whether hot, cold or any intermediate temperature. There are many so-called combination faucets, but they are nothing more or less than two single faucets with their outlets connected; the water does not mix in any of them, and frequently, if not in all cases, where the pressures are unequal, the stronger one will force the other back. The "Soderlund Twin Faucet" overcomes all these difficulties and mixes the water perfectly when there is a difference of 150 degrees or more in the



temperature of the two streams. It also works perfectly when there is a difference of eighty pounds or more in the pressure of the two streams. Where a cistern boiler is used, the cold water cannot force the hot water back or shut it off.

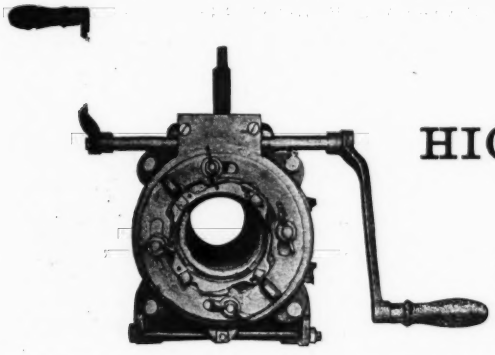
The "fuller" valve has the advantages over all others in its simplicity and quick action, but complaints are frequently made in regard to its inability to withstand hard usage and the short life of its washers, which are very difficult to replace. The "Soderlund Twin Faucet" is arranged so that any person can replace them in five minutes, and the washers last at least three years. It will not leak, and is less liable to be left running than any other combination faucet. It will not hammer or bind. It will stand the severest reasonable handling, and owing to its simple construction, and using the best composition metal in its manufacture, it will last a lifetime without becoming out of order. It has only one handle to manipulate, is quicker in its action, and will give water at the required temperature in less seconds than it will take minutes with any other faucet.

The "Soderlund" device for showers and sprays is fitted with a cam of different shape, which will make it impossible to get the hot water without enough cold to eliminate the danger of being scalded. This is designed for gynasiums, asylums, clubs and hotels, where the hot water varies from 100 to 200 degrees, and where inexperienced and forgetful persons using this device are perfectly free from the great danger of being scalded.

The price of the "Soderlund" fixtures does not exceed that of any other high-grade fixture, and it accomplishes more than any other combination fixture. Information in regard to these fixtures, prices, etc., cheerfully furnished on application.

Barr Bros., Rochester, N. Y., have some work on hand in which they are using Coopers Nautilus closet.—Adv.

Combination Vise and Screw Cutting Machinery



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M. M. Buck Mfg. Co., St. Louis, Mo.
Knight & Jillson, Indianapolis, Ind.
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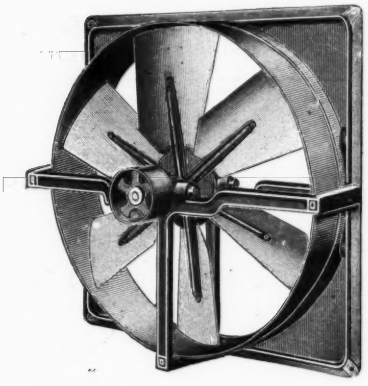
TRIUMPH EXHAUST FAN



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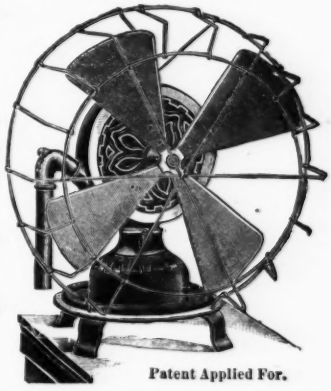

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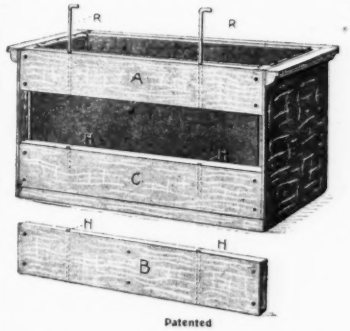

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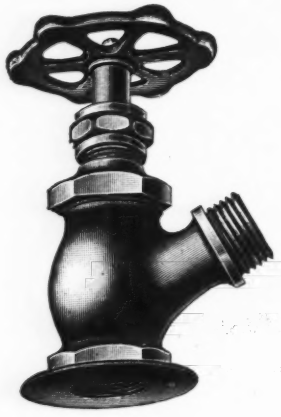

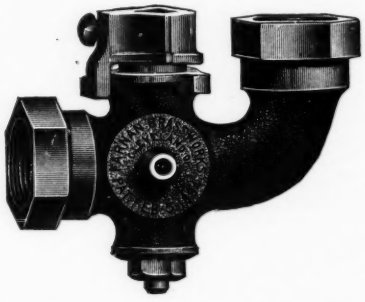

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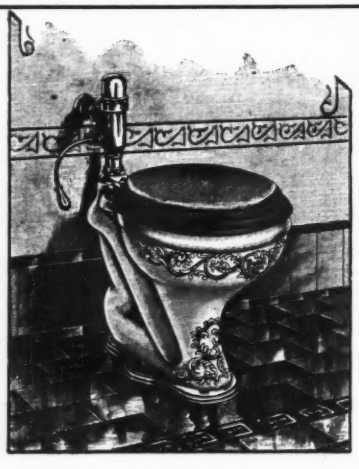

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Fig. E. 99. ANGLO. Lever action.

IT WILL PAY YOU TO DROP US A LINE FOR OUR CIRCULARS AND PRICES OF

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"AQUAMETER"

It is a self-measuring flush valve for water closets and urinals, automatically measuring the water for each flush. No more ball cocks, individual tanks or flush pipes needed, as it may be attached direct to pipe from city main or storage tank. Made in two styles, **lever action and seat action.** The WATROUS "AQUAMETER" is in use in many of the best buildings throughout the country, giving perfect satisfaction in all cases. We would be pleased to refer you to same on application. We use no cup washers in the construction of this valve. Manufactured and for sale by

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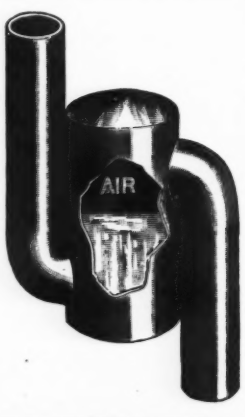

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We extend to the trade and our plumber friends in general for their very liberal patronage of the **Clean Sweep Trap** the past year. We hope a continuance of your good will and if possible shall give you a better article in the Trap line than ever. The **Clean Sweep Trap** has no mechanical features whatever. Clean, wholesome, sanitary, under all conditions. **Please have** an eye on the **Clean Sweep Fuller work,** fine appearance, excellent workmanship, hammerless. That's all. Traps are sold by all jobbers in the United States, England, Canada, Germany, Norway.

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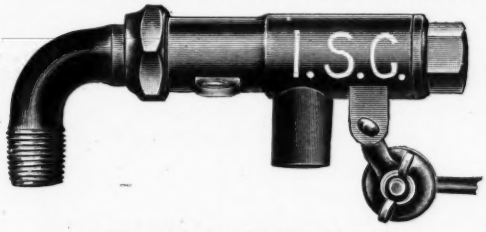
FOR HIGH OR LOW PRESSURE.



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Sizes ½ inch to 4 inches in stock.

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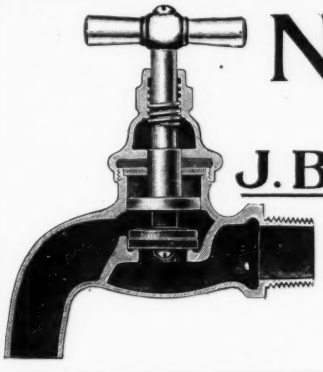

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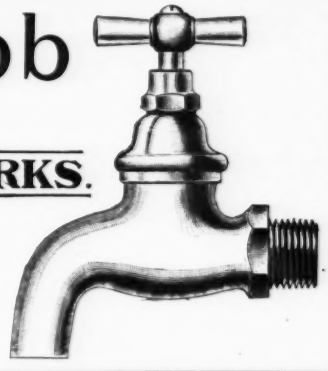

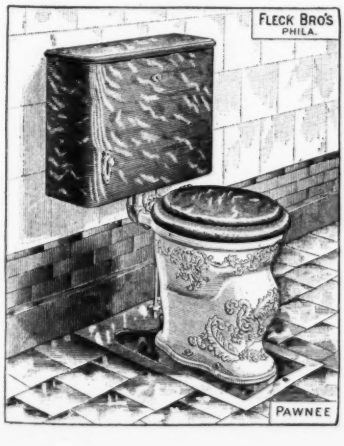

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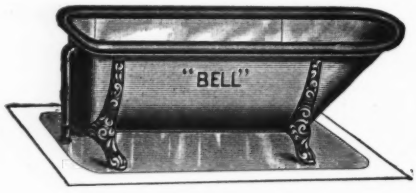

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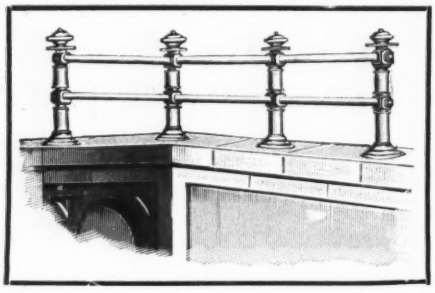

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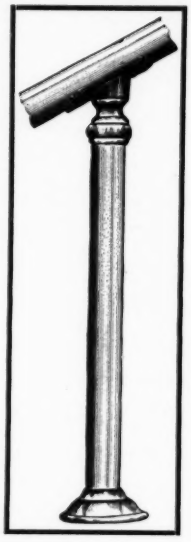

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The Barrett Sewer and Tide Trap has been in use by the United States Government for the past *Fifteen Years* which attests its *Value* as the *Best Trap* on the market. Government engineers pronounce it the most scientific trap made and the plumbing inspectors in every section of the United States consider it the ideal trap of this generation. Write for detailed description of the only trap that has conquered all opposition and is today the most scientific sewer and tide trap manufactured. Write for discounts.

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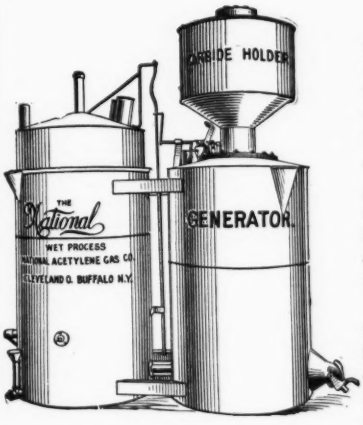

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The carbide is fed into the water in a granulated form, thereby insuring cool, pure gas at all times. By our process of purification we are enabled to use Acetylene gas for cooking and running gas engines. The new National is fully approved by all the Boards of Fire Underwriters throughout the United States. **Local and General Agents Wanted**

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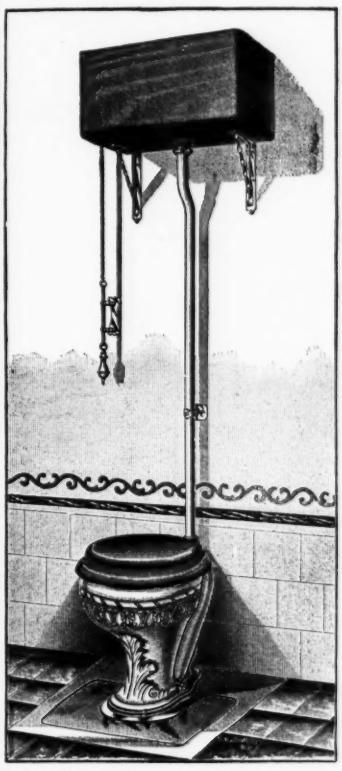

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A Beautiful, Clean and Durable Sanitary Fixture.

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GUARANTEED NOT TO STICK OR LEAK

MOST PERFECT VALVE MECHANISM FOR CONTROLLING FLUID PRESSURE.

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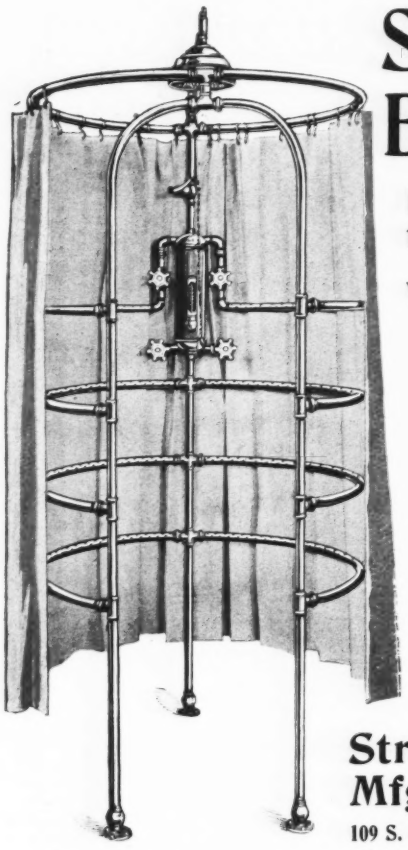

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Do we make them?

Well, we guess yes.

and any kind you may want, at prices that will interest you.

Catalogue for the asking.

Estimates cheerfully furnished on any special designs wanted.

Street & Kent Mfg. Co.

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Accessible Sewer Flushing Fittings.

Flushing Clean-out Trap.

Four Way Cleanout and Branch.

Straightway Backwater Gate.

Resist sewer or back-water pressure; location of sewers always known and accessible without disturbing floors or concrete; each fitting has iron inspection manhole to surface, with tight but removable cover; flushed by hose or may be connected to main water supply.

Made for either iron or clay pipes. Back-water gates may be attached preventing flooding of cellars. Can you imagine anything better?

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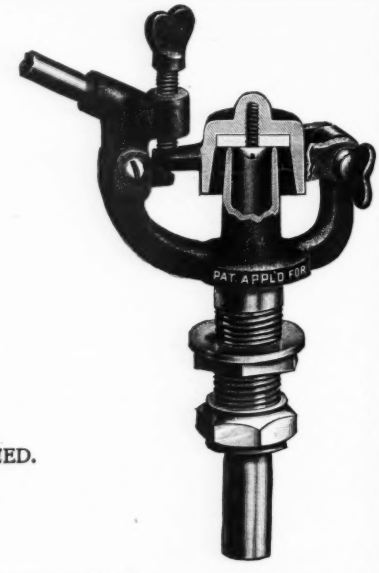
High Pressure Ball Cock

CANNOT POUND.
ALWAYS CLOSES.
ACCESSIBLE.
DURABLE.



PERFECT AND GUARANTEED.

MADE ONLY BY

WOLVERINE BRASS WORKS

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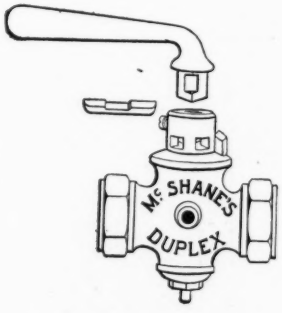
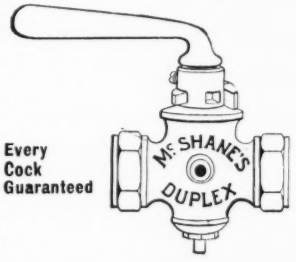
THE

"Duplex" Stop Cock



One of Simplest Cocks on the Market To-day

The above shows how easily the Cock can be taken apart and made either Right or Left hand as desired.



Every Cock Guaranteed

They are made of best metal and thoroughly ground

Each Cock is tested before leaving the factory

Manufactured only by

Henry McShane Mfg. Co.

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You May Need Your Money!!!

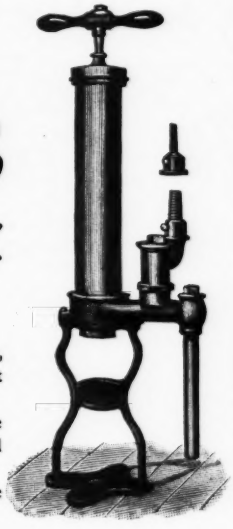
Don't buy 3 Pumps when one will do the work.

THE

PERKES

Patent Combination Air, Force and Test Pump.

Patented March 15, 1898.



Will test soil pipe, prove gas pipe, and there is no force pump made that is its equal.

No stuffing boxes; all valves are on the outside and work equally well with air or water.

Our circular will tell you of the other good points.

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Plumbers Profit

We want every plumber to send for a free sample of

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We want you to know by practical use, of the superior qualities of our

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All joints whether steam, gas or water piping readily opened at any time.

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is not affected by water, steam, gas, acids, alkalis, heat or cold. Write to-day for free sample.

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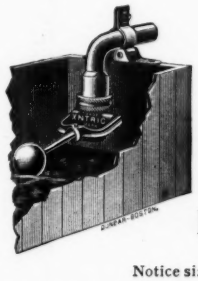
As you have been looking for it these many years.



The Xntric Ball Cock

For High or Low Pressure

Notice size of Ball. It is only 3½ inches

Practically noiseless. Guaranteed for two years. There is positively no hammering, and the only one on the market where the valve is closed by water pressure, and which obviates all danger of accident. Been on the market and heartily approved for three years. For use with hot or cold water.

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36 Columbus Ave. Boston, Mass.

In use in Massachussetts State House and United States Postoffice, Boston.

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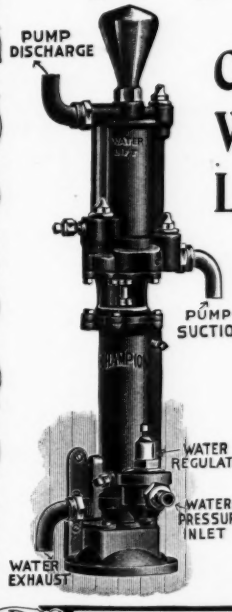
IT PAYS

TO PUT IN THE

CHAMPION WATER LIFT



For pumping cistern water or for increasing city pressure it is the BEST.

IT WORKS PERFECTLY.

That is our guarantee, and our name is guarantee that the construction is right. Handled by all large jobbers. Write for catalog.

MADE ONLY BY

THE CLEVELAND FAUCET COMPANY

CLEVELAND: 15-27 Frankfort Street.
NEW YORK: 4 Great Jones Street.
CHICAGO: 92 Franklin Street.
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THE CHAMPION WATER LIFT

All first class Plumbers
are using the
New Style
Broughton Self Closing
Basin Cock
NO EXPOSED SURFACES, EASILY KEPT CLEAN
THE BROUGHTON SELF-CLOSING BIBBS & COCKS HAVE BEEN ON THE MARKET SEVERAL YEARS - SUPERIOR TO ALL OTHERS FOR SIMPLICITY AND STRENGTH - EVERY ONE WARRANTED.
Send for Circular and Price List
E. STEBBINS MFG. CO.
SPRINGFIELD MASS.

A GOOD ARGUMENT

IN FAVOR OF THE

Lyons Cocks

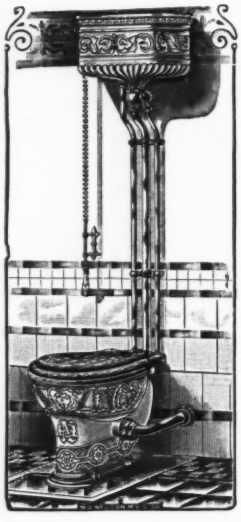
More of them sold last year than ever before. We are gratified to know that the trade appreciated our efforts to give them a first class article at a reasonable price. There are none can equal the Lyons Cocks.

MANUFACTURED BY

CLEVELAND BRONZE & BRASS WORKS

CLEVELAND, OHIO

PLUMBERS' SUPPLIES



Nelson Syphonia Water Closet

Pneumatic syphon

PRICE REDUCED
QUALITY RAISED

N. O. NELSON MFG. CO., SAINT LOUIS

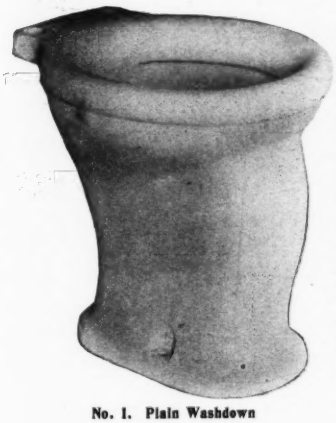
Zero Quick Wasting Hydrant,
Zero Jr. Hydrant,
Zero Self-Closing Hydrant.

Large Wastes, Quick Action, Non-Freezing.
Cheapest and best Hydrants in the world.

Zero Brass & Valve Mfg. Co.

BUFFALO, N. Y.

To the Plumbing Supply Trade:



No. 1. Plain Washdown

This cut represents our new improved plain wash down, which is made with walls one inch thick insuring unusual strength, thereby reducing liability of breakage to a minimum; it is therefore particularly adapted for public buildings, schools or any public place where closets are subjected to hard usage, and is designed to take the place of imported or domestic fire clay closets, and being constructed of a hard vitreous china body it is guaranteed against crazing. We can also furnish these closets with syphonic action or syphon jet.

We manufacture everything in the sanitary earthenware line and pay particular attention to specialties. All closets being tested before leaving our works, we guarantee their working qualities.

Bellmark Pottery Co.

P. O. Box 547. TRENTON, N. J.

THE REX.

THE KING

of them all.

Syphon Hopper and Trap Combined.

Surpassed by no Closet on the Market.

This closet has **full water ways** through all the **syphon pipes, a large water surface** and 3 inch Seal. It is made for high or low tank. Embossed or plain surface.

Earthenware Specialties designed and finished with unsurpassed art and workmanship.

The Sanitary Earthenware Specialty Company

Trenton, N. J.

DESTROYED BY FIRE!

CHICAGO, March 21, 1901.

To the Trade:

With regret we respectfully inform you of our loss by **FIRE,** which occurred this morning, destroying our entire factory and salesroom, known as 205 East Randolph Street, at which location we have been for the last thirteen years.

Fortunately, we are not **wiped out,** as we operate **TWO FACTORIES,** leaving us in very good condition to fill our orders promptly. Our other factory is at

452 & 454 MILWAUKEE AVE.

in which our facilities are unsurpassed for manufacturing goods.

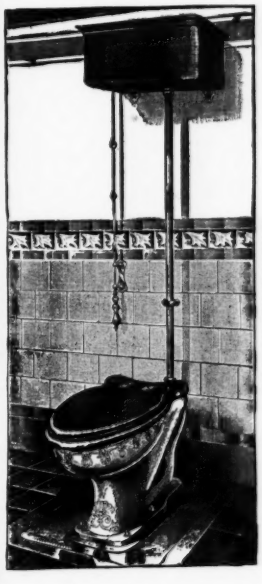
We ask you to kindly put up with a little inconvenience until we can get our records complete, which will not delay matters more than a week, and we sincerely trust you will not hesitate to place your many orders with us, assuring you that they will receive prompt and careful attention, and that your many favors will be appreciated.

Yours very respectfully,

R. WILLIAMSON & CO.

Telephone Monroe 1302

P. S. ADDRESS ALL COMMUNICATIONS TO 452 and 454 MILWAUKEE AVENUE.



—THE—

ORINOCO Syphon Jet Closet.

This Orinoco Syphon Jet Closet is what you should have. This is the most perfect and noiseless closet now manufactured. The workmanship and High Grade Finish of the Orinoco Closet cannot be excelled.

IT SPEAKS FOR ITSELF TRY ONE AND BE CONVINCED.

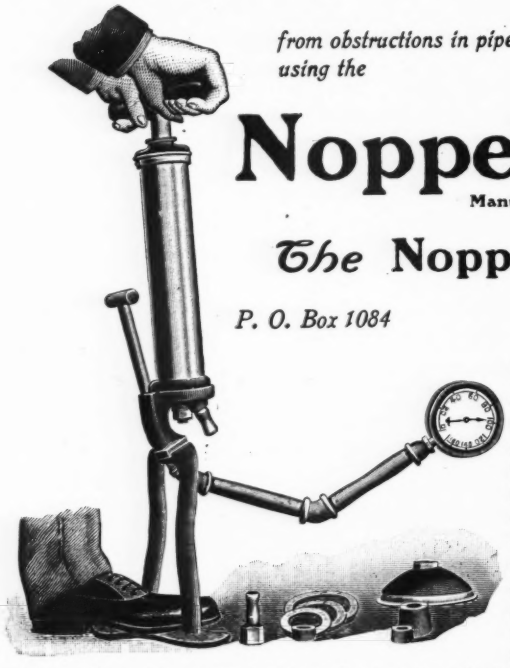
MANUFACTURED BY

THE KING MFG. CO.

LIMITED.

205 Wood Street, Pittsburgh, Pa.

No More Trouble



from obstructions in pipes. They can be easily removed by any one using the

Noppel Pump

Manufactured by

The Noppel Pump Co.

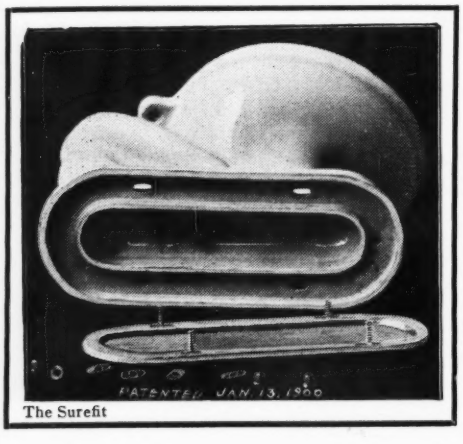
P. O. Box 1084 *HARTFORD, CONN., U. S. A.*

This pump is a Combination Lift, Force, Discharge and Test Pump and you can not only force air, liquid or gas into pipes, but can continue to do so, getting an ever increasing pressure. With no alteration in fittings or position of pump you can instantly change from force to suction and continue to exhaust air or draw out and discharge water and loose material. **No Other Pump has these Advantages.**

SEND FOR CIRCULAR

INDESTRUCTIBLE **SIMPLE IN CONSTRUCTION** **EASILY OPERATED**

Paste this in the catalogue you use most:



The Surefit

You may not need it to-day, but you certainly will have to have a

SUREFIT

The floor connection is sure to be tight. The first flush tests it. Ask your jobber for price.

The Trenton Potteries Company's goods are sold only through Plumbing Supply Houses.

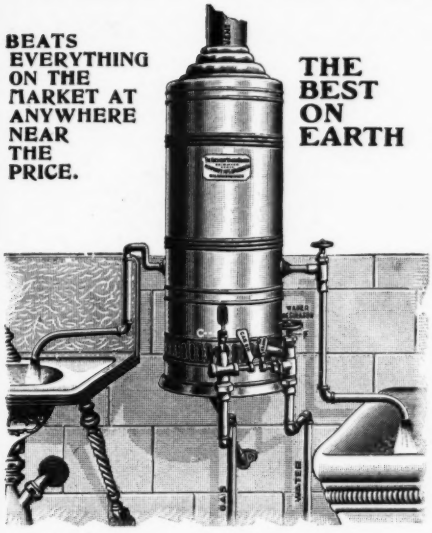
The Trenton Potteries Company was awarded two grand prizes at the Paris Exposition, in competition with the entire world—a Gold Medal in the Hygienic Department and another in the Department of Ceramics—the Highest Award granted on Sanitary Fixtures and Decorative Ware.

THE TRENTON POTTERIES COMPANY, TRENTON, N.J.

Finest Grades of Sanitary Earthenware and Vitrified China, Solid Porcelain Bath and Laundry Tubs, Sinks, Etc.

BEATS EVERYTHING ON THE MARKET AT ANYWHERE NEAR THE PRICE.

THE BEST ON EARTH



This is our No. 8 Crescent Heater.

Do You Sell Instantaneous Water Heaters? Then

GET IN LINE

TO PUSH THE

Humphrey Crescent Instantaneous Water Heaters

We guarantee everything exactly as represented. Our prices are the **LOWEST.** If you cannot sell them, write and we will tell you how to do it and send you our new catalogue.

The Humphrey Mfg. & Plating Co.

KALAMAZOO, MICH., U. S. A.

DOMESTIC ENGINEERING

IS THE LEADING TRADE JOURNAL DEVOTED TO PLUMBING, HEATING, LIGHTING AND VENTILATING.

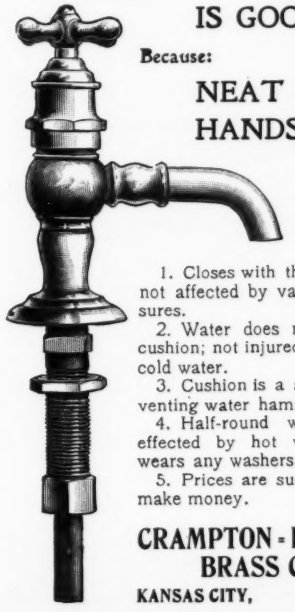
Farley S. G. Work

IS GOOD.

Because:

NEAT AND HANDSOME

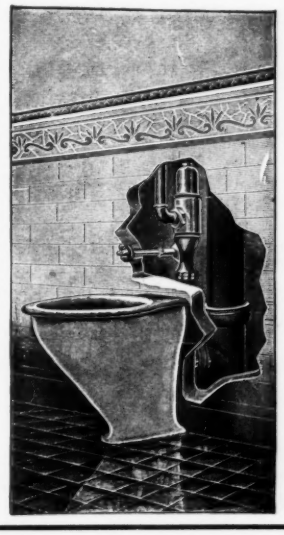
AND



1. Closes with the pressure; not affected by varying pressures.
2. Water does not touch cushion; not injured by hot or cold water.
3. Cushion is a spring; preventing water hammer.
4. Half-round washer not effected by hot water; outwears any washers made.
5. Prices are such that you make money.

CRAMPTON-FARLEY BRASS CO.

KANSAS CITY, MO.



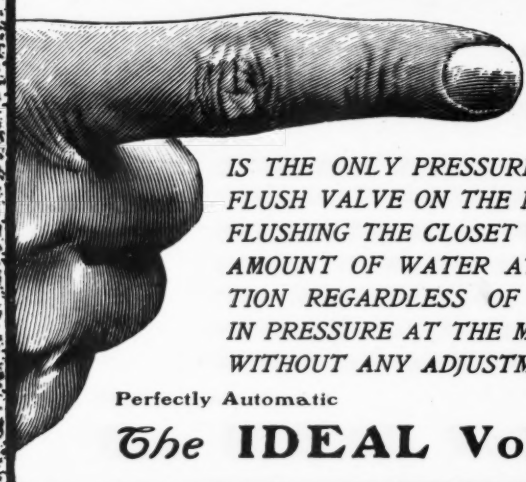
National Enameled Iron Jail Closet

Simple, durable and easily adjusted.
No overhead tanks required. Cannot be tampered with—no movable parts being exposed.

MANUFACTURED BY

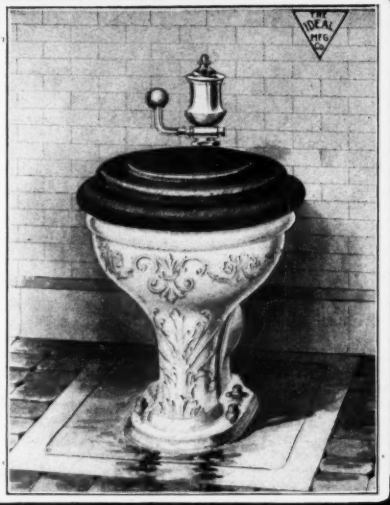
The National Supply Company

TOLEDO, OHIO



THAT

IS THE ONLY PRESSURE REGULATING FLUSH VALVE ON THE MARKET. FLUSHING THE CLOSET WITH THE SAME AMOUNT OF WATER AT EACH OPERATION REGARDLESS OF FLUCTUATIONS IN PRESSURE AT THE MAIN OR SUPPLY WITHOUT ANY ADJUSTMENTS.



Perfectly Automatic Patented

The IDEAL Volumeter

THE IDEAL MFG. CO. DETROIT MICH.

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Manufacturers of

Fine Sanitary Specialties

DETROIT MICH.

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The

"Sedate"

We Handle all grades of Low Down Tank outfits, including syphon jet, syphoning hoppers with jets and plain hopper and trap combinations.

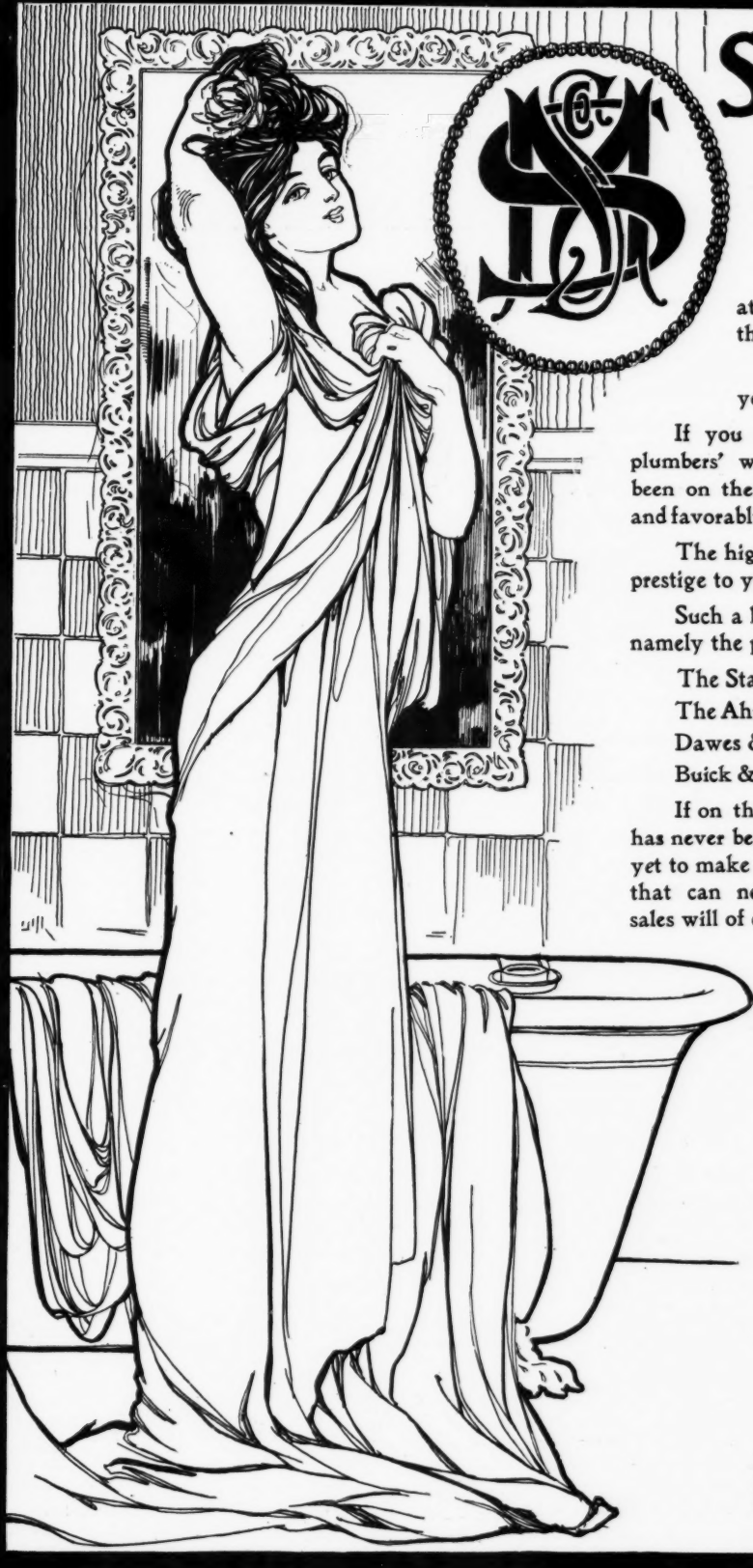
We Manufacture the "QUIET" syphon jet and the "SEDATE" syphoning hopper outfits and recommend them to all who desire a thoroughly high grade and highly perfected outfit.

The TANKS, seats and lids are made from carefully selected hard woods, which are highly finished. The "Quiet" and "Sedate" tanks have heavy tinned copper linings and all seams are locked and carefully soldered.

Haines, Jones & Cadbury Company

1128-44 Ridge Avenue
1423 Chestnut Street

Philadelphia, Pa.



STANDARD BATHS

The measure of success which you attain depends to a great extent upon the line of goods that you handle.

Perhaps to a greater extent than you realize.

If you sell a line of enameled iron goods, plumbers' woodwork and brass goods that has been on the market for a long time, and is well and favorably known, you ought to make money.

The high reputation of the goods will add prestige to your business and influence trade.

Such a line is that which we manufacture, namely the product of these four companies:

The Standard Mfg. Co. Pittsburg, Pa.
The Ahrens & Ott Mfg. Co., Louisville, Ky.
Dawes & Myler Works, New Brighton, Pa.
Buick & Sherwood Mfg. Co., Detroit, Mich.

If on the other hand you carry a line that has never been advertised to any extent, and has yet to make a name for itself, or an inferior line that can never hope to gain reputation, your sales will of course be comparatively smaller.

Which will you handle, a line that will bring business to you, or a line the name of which means nothing to your customer?

Free catalogues are sent on application

The Standard Sanitary Mfg. Company,

PITTSBURG, PA.

NEW YORK
PHILADELPHIA
CLEVELAND
CHICAGO
MONTREAL
LOUISVILLE

Do You Buy Right?

"Goods well bought are half sold."

You must disarm your competitors. Domestic Engineering's

BUYERS' GUIDE

to manufacturers of Plumbing, Steam and Hot Water Heating Goods, Engineers and Mill Supplies, for 1901, is a necessary book to the careful buyer who wants to get goods from first hands. It contains under each article used in the plumbing and heating business, a complete list of the names and addresses of the firms who manufacture that particular item. Our index shows nearly 1,000 articles are so classified. Would it not pay you to have it always at hand?

Price, $3.00 Delivered

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58-64 North Jefferson Street, Chicago, Ill.

THE "GEGENSTROM"
HOT WATER APPARATUS

SCHAFFSTAEDT'S PATENT

FOR THE INSTANTANEOUS
PRODUCTION OF

WARM OR HOT WATER

BY MEANS OF STEAM.

ESPECIALLY ADAPTED FOR

RAIN BATHS

IN INSTITUTIONS,
REFORMATORIES
AND PRISONS,
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INSANE ASYLUMS,
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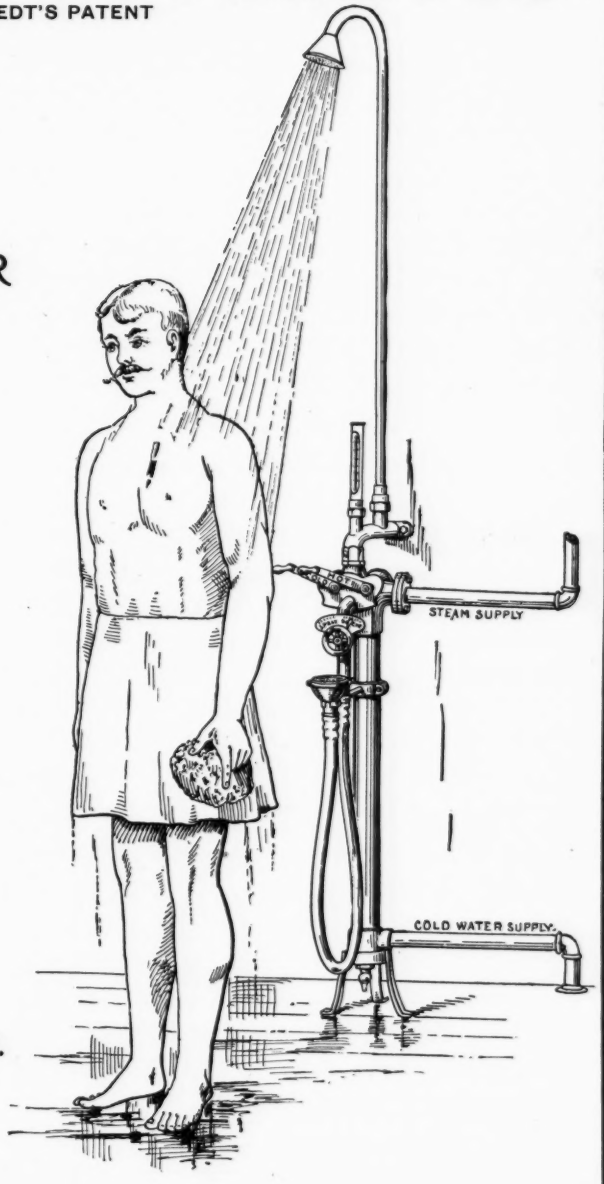
ARMORIES
AND IN
PEOPLE'S BATH ESTABLISHMENTS.



RUNDLE-SPENCE MANUFACTURING COMPANY

THE PEOPLE WHO DESIGN AND MAKE MODERN AND RELIABLE
PLUMBING FIXTURES. (THE GUARANTEED KIND.)

89-91 WISCONSIN STREET
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WESTERN AGENTS

52 DEARBORN STREET
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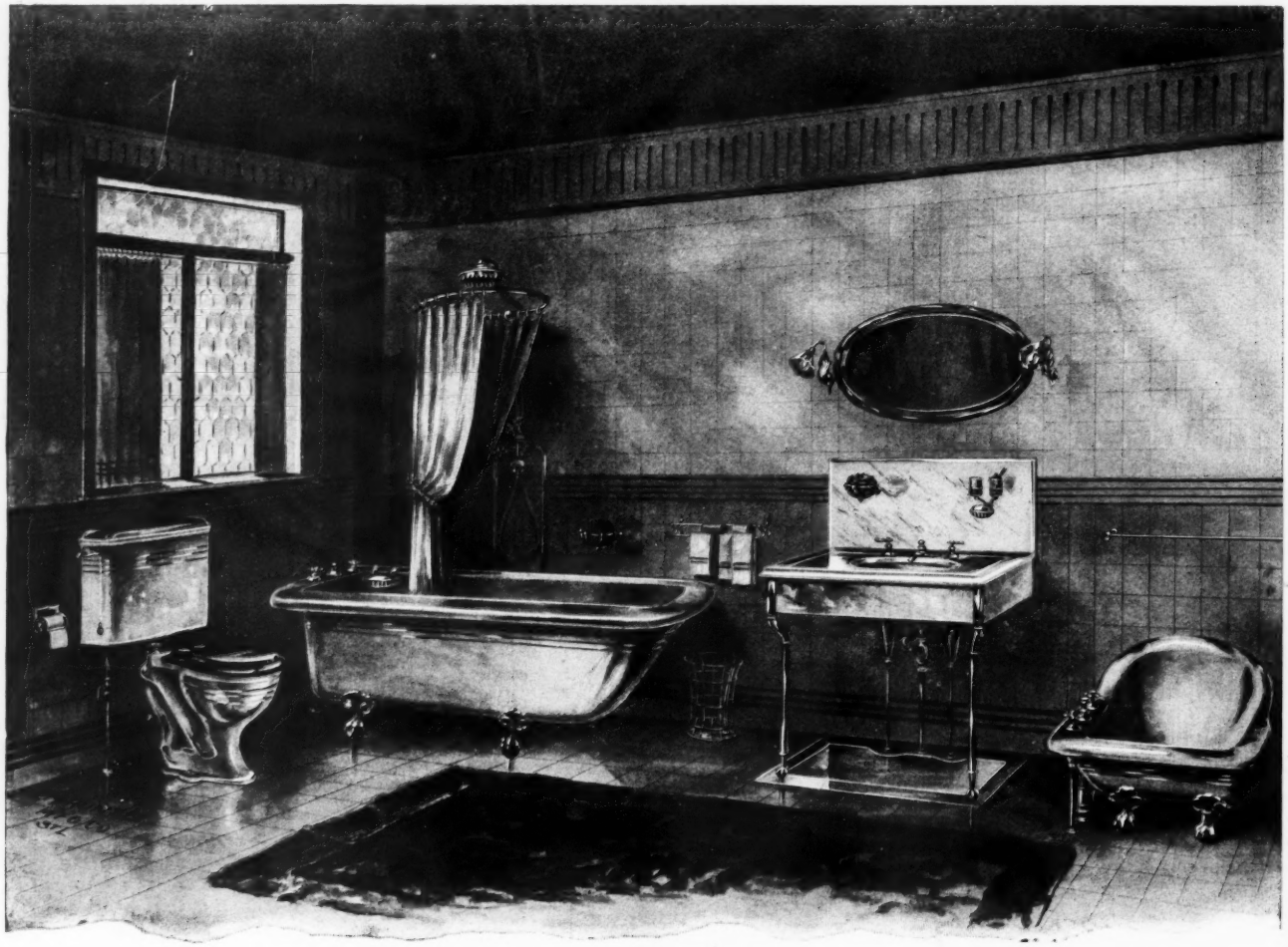
RUMSEY'S

"Bonita" Bath Room Combination

WITH GOLD LINE DECORATION.



EMBRACING

"BONITA" ROLL RIM ENAMELED BATH with NICKEL PLATED FIXTURES and SHOWER.
ROLL RIM ENAMELED SITZ BATH with NICKEL PLATED FIXTURES.
"BONITA" SYPHON JET CLOSET with LOWDOWN PORCELAIN TANK.
ITALIAN MARBLE LAVATORY with NICKEL PLATED FIXTURES and Plate Glass MIRROR.

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810 NORTH SECOND STREET, ST. LOUIS, MO.

The JAMES ROBERTSON MANUFACTURING COMPANY

Manufacturers of

Lead Traps — *Enameled Bath Tubs*
Lead Bends — *Lavatories*
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Sheet Lead — *Sanitary Water Closets*
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Lead and Iron Ferrules.

FACTORY: 827 South Howard St.

Supplies and Tools for Plumbers, Gas and Steam Fitters

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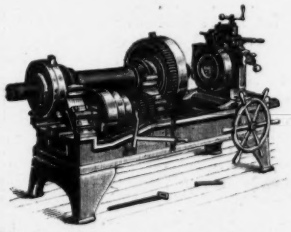

Peerless No. 4, Imp. 1 in. to 4 in.

PIPE THREADING AND CUTTING MACHINERY

To Cut from 1-8 inch to 18 inches

HAND OR POWER

Our Machines have Every Improvement for Accurate and Rapid Work.

Bignall & Keeler Mfg. Co., Edwardsville, Ill.

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"Repeat it to yourself,
write it down,
do not forget,
but remember,
remember,
remember that advertising is
the news of business,
that good advertising is good
news,
that good news finds listening
ears."

CHARLES MILLAR & SON COMPANY

SELLING AGENTS, UTICA, N. Y.

CAST IRON PIPE

And Specials for Water and Gas. Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.
Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc.
Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.

"The Cast Sink Must Go"

"Columbus" and "New Era"

Wrought Steel Sinks.

ROLLED RIM AND FLAT EDGES.

Painted, Galvanized, Blue Enameled,
Grey Enameled, White Enameled.

Write for Catalogue and Prices...

The Kilbourne & Jacobs Mfg. Co.,
COLUMBUS, OHIO.

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F 1360—Standard Oval Marble Lavatory.

This design, as shown, is one of many handsome designs shown in our Catalogue F, and for workmanship and material is of the best.

The 2-inch thick marble is deeply countersunk, and mouldings are all made with rounded edges which are easily kept clean and not easily marred.

The mirror frame is of zinc white finished wood and the best plate mirror is used.
All nickel plated work is heavy cast brass and highly finished.

This, and many other styles of Lavatories and Bath Room Fixtures are on exhibit at our Show Rooms, 91 Dearborn Street.

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